Payment for ecosystem services benefit from simple incentives and within-group dependence: Evidence from a framed field experiment in Lao PDR

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PES

CO2

Ecosystem Services!

$$$

AVOIDED

DEFORESTATION

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Protecting the Climate by Saving Forests
Shifting Cultivation

- How to incentivize reduced forest clearing?
  - Payments or insurance?
  - Group or individual target?
  - Crowding out of intrinsic motivation?
- Why do some incentives work better than others?

Photo: moussons.revues.org/1887
How to answer these questions?

- **Surveys**
  - A social science standard
  - Inexpensive, fast
  - But realistic?
- **Full-scale implementation**
  - High realism
  - Expensive, slow
- **Some middle way?**
Role-playing games

Games: Not just for nerdy teenagers
Shifting cultivation game

• Allows different PES mechanisms
• Payouts:
  – Increase with cultivation
  – Decrease with remaining forest
    (reduced ecosystem services)
  – Depend on random weather
• Doesn’t assume elimination of resource use
• Prisoners dilemma dynamic
• Tangible payouts
Game structure

- 24 rounds in 3 stages
  - Stage 1 (R1-R8): no treatment
  - Stage 2 (R9-R16): 1 of 3 possible treatments
  - Stage 3 (R17-R24): no treatment
Outcome Variables

- Cultivation
- Stage 1 (Pre-Treatment)
- Stage 2 (Treatment)
- Stage 3 (Post-Treatment)
- Treatment Effect
- Lasting Effect
Treatments

• **Individual bonus (IB):**
  – 200 point payout if ≤3 patches cultivated

• **Group bonus (GB):**
  – 200 points if ≤24 patches cultivated by group

• **Insurance (INS):**
  – Guaranteed payout equal to good rain if ≤3 patches cultivated by individual
Field Implementation

- Phonxay District, Louangprabang Province, Lao PDR
- 4 Villages
- GB, IB and INS treatments applied in each village
- 2 observers
- Post-game survey (fairness and motivation)
RESULTS
Treatment Effect

<table>
<thead>
<tr>
<th>Change in cultivation</th>
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<tbody>
<tr>
<td>-4 -3 -2 -1 0 1</td>
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<table>
<thead>
<tr>
<th>Group Bonus</th>
<th>Individual Bonus</th>
<th>Insurance</th>
</tr>
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<tbody>
<tr>
<td>a *</td>
<td>a, b *</td>
<td>b</td>
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</tbody>
</table>
Motivation

Grp Bonus | Ind Bonus | Insurance

0.0 0.2 0.4 0.6 0.8 1.0
Fairness perception

Grp Bonus  | Ind Bonus  | Insurance

Fairness perception bar chart showing:
- Grp Bonus with the highest fairness perception
- Ind Bonus
- Insurance
Conclusions

• Group payment > individual payment > insurance
• Lasting effects are minimal
• No crowding out
Practical Implications

• Within-group dependence helpful
• Insurance is tricky, but not impossible
Thanks to:

- Field team
  - Somvilay ‘Noi’ Chanthalounnavong
  - Souphithak ‘Tock’ Chanthavonghak
  - Khamnang ‘Nang’ Konnpakdee

- Office and field coordination
  - Shintia Arwida
## Optimal harvesting and payouts

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<tbody>
<tr>
<td>Control</td>
<td>6</td>
<td>6*(100-6*8)*2= 624</td>
<td>10</td>
<td>10*(100-10*8)*2= 400</td>
<td>10*(100-6*7-10)*2= 962</td>
<td>6*(100-6*7-10)*2= 576</td>
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<tr>
<td>Individual Bonus</td>
<td>3</td>
<td>3*(100-3*8)*2+200= 656</td>
<td>10</td>
<td>10*(100-10*8)*2= 400</td>
<td>10*(100-3*7-10)*2= 1380</td>
<td>3*(100-3*7-10)*2+200= 614</td>
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<tr>
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<td>3*(100-3*8)*2+200= 656</td>
<td>10</td>
<td>10*(100-10*8)*2= 400</td>
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<td>3*(100-3*7-10)*2= 414</td>
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<tr>
<td>Insurance</td>
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<td>10</td>
<td>10*(100-10*8)*2= 400</td>
<td>10*(100-3*7-10)*2= 1380</td>
<td>3*(100-3*7-10)*3= 621</td>
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</table>
Basic game mechanics

- 8 players
- Forest has 100 parcels – new each round
- Each player cultivates 0-10 parcels/round
- Individual harvest proportional to planted area and un-cut forest
- Randomly generated rainfall (1 or 3)
- Tangible payouts
Example calculations

Player 1 cultivation: 7 patches
Total cultivation: 44 patches
Uncultivated: 56 patches
Rainfall: Good (3)

Total harvest:
7 \times 56 \times 3 = 1176