Project Findings
and Future Potential

Dr. Aidan Keane
Imperial College London

BEST Project Policy Maker, Practitioner,
Community User and Researcher Workshop
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Introduction
The BEST Project approach

- Policies / Incentives
- Household decisions
- Land use
  - Social outcomes
  - Biodiversity outcomes
Introduction
What sort of questions are we asking?

Household decisions

Which livelihood decisions work well?

Modelling based on existing datasets

Experimental games

What livelihood decisions do people make?

Discrete choice experiments

How do people value different livelihoods?
What livelihood decisions do people make?
Economic games

Introduction

Games as experiments

• Behavioural economics
• Controlled settings
• e.g. co-operation, common-pool resources, public goods
• Mostly lab-based, undergraduate populations in USA/Europe
• Highly abstract

This study:
• Game tailored to real situation
• Played with local people, familiar with decision-making context
• Dynamic resource; droughts
Economic games
Introduction

Participants

- Groups of 8-10 individuals
- 191 participants in total
- ~50:50 conservancy members/non-members

Key variables

- Outcomes:
  - cattle vs. cash
  - legal vs. illegal grazing
- Predictors:
  - situation in game
  - participant characteristics
Economic games
Broad patterns

Mean wealth outcomes

- Communal: 21.8 units/individual
- Private: 20.1 units/individual
- Conservancy: 23.2 units/individual

Mean change in wealth per round (non-drought / drought)

- Communal: + 11.0% / - 34.1%
- Private: + 8.2% / - 38.2%
- Conservancy: + 11.3% / - 31.0%
Economic games
Broad patterns

Resource allocation

• Communal: 62.9% cattle
• Private: 71.0% cattle
• Conservancy: 64.9% cattle

Illegal grazing

• Communal: 44.7% illegal
• Private: 35.0% illegal
• Conservancy: 51.5% illegal
Economic games
Factors affecting decision-making

“In-game” variables
- Treatment
- Wealth
- Turn
- (% Cattle)

Participant characteristics
- Conservancy membership
- Opinion 1: Resources
- Education
- Opinion 2: Subdivision
- Land Owned
- Opinion 3: Conservancies
- Cattle Owned

“In-game” variables
- Treatment
- Wealth
- Turn
- (% Cattle)

Participant characteristics
- Conservancy membership
- Opinion 1: Resources
- Education
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- Land Owned
- Opinion 3: Conservancies
- Cattle Owned
Economic games
Effects of “in-game” variables on decision-making

Allocation of resources to livestock

Proportion of cattle grazed illegally
### Economic games
Comparison with empirical trends

<table>
<thead>
<tr>
<th>Period</th>
<th>Reserve edges</th>
<th>Reserve core</th>
<th>Reserve</th>
<th>Inner ranches</th>
<th>Outer ranches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970s</td>
<td>10</td>
<td>5</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>1980s</td>
<td>20</td>
<td>10</td>
<td>30</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>1990s</td>
<td>30</td>
<td>20</td>
<td>40</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>2000s</td>
<td>40</td>
<td>30</td>
<td>50</td>
<td>30</td>
<td>25</td>
</tr>
</tbody>
</table>

**Graph:**
- **Y-axis:** Number/km²
- **X-axis:** Period (1970s, 1980s, 1990s, 2000s)
- **Legend:**
  - Reserve edges
  - Reserve core
  - Reserve
  - Inner ranches
  - Outer ranches

**Image:** Herd of cattle walking on a muddy path.
### Economic games

**Effects of personal characteristics on decision-making**

<table>
<thead>
<tr>
<th>Education</th>
<th>Allocation of resources to livestock</th>
<th>Proportion of cattle grazed illegally</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Comm. / Priv. / Cons.)</td>
<td>(Comm. / Priv. / Cons.)</td>
</tr>
<tr>
<td></td>
<td>+ / + / +</td>
<td>- / + / +</td>
</tr>
<tr>
<td>Land Owned</td>
<td>- / - / -</td>
<td>+ / - / +</td>
</tr>
<tr>
<td>Cattle Owned</td>
<td>+ / + / +</td>
<td></td>
</tr>
<tr>
<td>Opinion 2:</td>
<td>+ / + / +</td>
<td>+ / + / +</td>
</tr>
<tr>
<td>Subdivision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Economic games
e.g., Effect of cattle ownership

Participants w. 50+ livestock allocate 8.7% more resources to cattle within the game
Choice experiments

How do people value different livelihoods?
Choice experiments
Preferences
Choice experiments
Understanding preferences

Attributes

Flavour: Chocolate and strawberry
Delivery mechanism: Waffle cone
Price: 200 KSh

Flavour: Chocolate and chopped nuts
Delivery mechanism: Stick
Price: 250 KSh
Choice experiments
Our experimental design

Monthly wage
- 0 KSh/month
- 6,000 KSh/month
- 10,000 KSh/month

Conservancy
- No involvement
- 75 acres for 9,000 KSh
- 150 acres for 18,000 Ksh

Number of cattle
- No cattle
- 40 animals
- 100 animals

Access for grazing
- Grazing allowed
- Grazing forbidden

Number of small stock
- No smallstock
- 80 animals
- 200 animals

Cultivation
- No cultivation
- 5 acres cultivated
Choice experiments
Our experimental design

### Choice 1

<table>
<thead>
<tr>
<th></th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of cattle</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>2. Number of shoats</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Private grazing land and monthly conservancy payments</td>
<td>No private grazing land, 18,000KSh conservancy payments</td>
<td>75 acres private grazing land, 9,000KSh conservancy payments</td>
</tr>
<tr>
<td>4. Grazing permitted in conservancy during drought</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5. Monthly wage</td>
<td>6,000KSh</td>
<td>6,000KSh</td>
</tr>
<tr>
<td>6. Area of land cultivated</td>
<td>0</td>
<td>5 acres</td>
</tr>
</tbody>
</table>
Choice experiments: Men
Relative values of livelihood components

- Wage (6,000 KSh/month)
- Wage (10,000 KSh/month)
- Cattle (40)
- Cattle (100)
- Small stock (80)
- Small stock (200)
- Grazing access (Yes)
- Conservancy (50%)
- Conservancy (100%)
- Cultivation (Yes)

...but not leasing all land!

Diminishing marginal value of income?
Conservancy membership and grazing valued highly
Choice experiments: Men
Substitution rates between attributes

- 40 cattle ≈ 16,475 KSh/month
- 40 small stock ≈ 13,671 KSh/month
- 5 acres cultivation ≈ 44 cattle
Choice experiments: Men
Substitution rates between attributes

Access to grazing
≈ 59 cattle

Leasing 50% for 9,000 KSh
≈ 45 cattle

Leasing 100% for 18,000 KSh
≈ -5,499 KSh/month
Choice experiments: Men
Variability between individuals

- Wage (6,000 KSh/month)
- Wage (10,000 KSh/month)
- Cattle (40)
- Cattle (100)
- Small stock (80)
- Small stock (200)
- Grazing access (Yes)
- Conservancy (50%)
- Conservancy (100%)
- Cultivation (Yes)
Choice experiments: Women
Differences between values of men and women

- Wage (6,000 KSh/month)
- Wage (10,000 KSh/month)
- Cattle (40)
- Cattle (100)
- Small stock (80)
- Small stock (200)
- Grazing access (Yes)
- Conservancy (50%)
- Conservancy (100%)
- Cultivation (Yes)

Relative value

- Men
- Women
Modelling optimal decisions

Which livelihood decisions work well?
Modelling decision-making

Introduction

Computer modelling allows:

• Exploration of theoretical understanding
• Assumptions --> Consequences
• Experiment with fewer constraints (e.g. scenarios)

Potential for unexpected outcomes
Modelling decision-making
Stochastic dynamic programming

Optimal actions over time in an uncertain environment

For the Maasai Mara
• Goal: Maximise survival
• Livelihood activities:
  • Cattle / small stock
  • Cultivation
  • Trading & wage-earning
• Heterogeneity:
  Land-holdings; Household size; Conservancy membership
Modelling decision-making
Communal scenario
Modelling decision-making
Subdivided scenario
Modelling decision-making
Conservancy scenario
Modelling decision-making
Comparison with empirical trends
Modelling decision-making

Next steps

Incorporate multiple, heterogeneous households
Examine overall effects at community level
Look for winners and losers at household level

Extend to consider changing climatic conditions

...and others, based on feedback!
Conclusions

Better understanding of household level processes driving landscape level changes.

Potential for unexpected consequences of rangeland policy

For discussion

• Interpretation of results
• Real-world relevance
• How to disseminate
• Influencing policy
www.ucl.ac.uk/best

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