The spatial-temporal dynamics of charcoal production in Zomba, Malawi

The influence of socio-economic factors

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Case study and methods

- **Zomba, Malawi**
- **Baseline Survey** (See Smith et al., 2015)
- **Village Sample Survey**
  - 23% (n=28) villages
- **Three case study villages**
  - Tree species harvesting
  - Village timeline
  - Group discussion
Extraction Patterns

Three Forest Areas
Six village groups
a) Species extraction pattern in Area 1

b) Species extraction pattern in Area 2

c) Species extraction pattern in Area 3
Average number of households actively producing charcoal per village

- East (n=4)
- Northwest (n=4)
- Southwest (n=5)
- North (n=9)
- Northeast (n=4)
- Central (n=2)

Year
- 1970
- 1971-1975
- 1976-1980
- 1981-1985
- 1986-1990
- 1991-1995
- 1996-2000
- 2001-2005
- 2006-2010
- 2011-2015
- 2016-2020
- 2021-2025
- Beyond 2025
Market and resource access

• Market Competition
• Enforcements
• **Elevation and Slope**
• **Distance to the resource**

<table>
<thead>
<tr>
<th>Village Grouping</th>
<th>Men only</th>
<th>Women only</th>
<th>Both men and women</th>
<th>Estimated hours walking one-way to resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>East (n=4)</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>5-6</td>
</tr>
<tr>
<td>Northwest (n=4)</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>3-4</td>
</tr>
<tr>
<td>Southwest (n=5)</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3-4</td>
</tr>
<tr>
<td>Central (n=2)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2-3</td>
</tr>
<tr>
<td>Northeast (n=4)</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1-2</td>
</tr>
<tr>
<td>North (n=9)</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>0-1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11</td>
<td>1</td>
<td>16</td>
<td>-</td>
</tr>
</tbody>
</table>

Reported genders of active charcoal producers in different village groupings, and walking distances (hours) to resources.
Trends and events

- Poverty
- Population pressures
- Food security
- **Policy change**
- Employment opportunities

<table>
<thead>
<tr>
<th>Region</th>
<th>Poverty (n)</th>
<th>Population Pressures (n)</th>
<th>Policy Change (n)</th>
<th>Food Security (n)</th>
<th>Employment opportunities (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East (n=4)</td>
<td>1 (25%)</td>
<td>2 (50%)</td>
<td>1 (25%)</td>
<td>1 (25%)</td>
<td>3 (75%)</td>
</tr>
<tr>
<td>Northwest (n=4)</td>
<td>2 (50%)</td>
<td>0</td>
<td>1 (25%)</td>
<td>3 (75%)</td>
<td>2 (50%)</td>
</tr>
<tr>
<td>Southwest (n=5)</td>
<td>5 (100%)</td>
<td>2 (40%)</td>
<td>2 (40%)</td>
<td>0</td>
<td>4 (80%)</td>
</tr>
<tr>
<td>North (n=9)</td>
<td>8 (88%)</td>
<td>6 (66%)</td>
<td>2 (22%)</td>
<td>3 (33%)</td>
<td>7 (77%)</td>
</tr>
<tr>
<td>Northeast (n=4)</td>
<td>2 (50%)</td>
<td>3 (75%)</td>
<td>4 (100%)</td>
<td>1 (25%)</td>
<td>4 (100%)</td>
</tr>
<tr>
<td>Central (n=2)</td>
<td>1 (50%)</td>
<td>0</td>
<td>1 (50%)</td>
<td>0</td>
<td>1 (50%)</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>19</td>
<td>13</td>
<td>11</td>
<td>8</td>
<td>21</td>
</tr>
</tbody>
</table>

Number (and percentage) of Villages (n=28) in each group identifying influencing factors.
Further research

- Charcoal markets of small urban areas
- Opportunities to indirectly monitor forest use and species abundance
- How best to integrate spatial-temporal information into policy
  - Communities react faster to some policies (e.g. resource liberalisation)
  - Phasing of combined support and enforcement needs careful consideration
Conclusions and policy implications

• Substantial variation in the spatial-temporal production dynamics of Zomba’s supply shed

• Wide range of socioeconomic factors influence engagement in charcoal production

• Monitoring local and national trends and events can help to:
  – Identify high risk forest areas
  – Deliver locally relevant interventions