Participatory mapping of ecosystem services and livelihood impacts in agricultural landscapes

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Outline

• Agroecosystem context and landscape
• Participatory mapping approach
• Ecosystem service changes and implications
• Land access and soil status
• Diverse perceptions and impacts
• Conclusions
Agroecosystem Context

• Small-holder farmers in Sub-Saharan Africa face various interconnected ecosystem degradation challenges:
  • soil erosion, loss of soil fertility, deforestation, decreasing water availability
• This negatively impacts their food security and livelihoods
• Participatory mapping allows for farmers to assess the condition of ecosystem services and impacts on their livelihoods
• Mapping exercise facilitates farmers to explore opportunities to address these challenges
Agricultural Landscape

How is land use in the broader landscape impacting farmers’ livelihoods?

Farmers field

Agricultural landscape

How does management and use of the broader landscape affect ecosystem services that impact farmers’ livelihoods?

e.g. water quantity, erosion

Figures from Tittonell et al. 2012
Participatory mapping of ecosystem services in multiuse agricultural landscapes

• Adapted ecosystem service assessment tools and mapping methods
• Targeted at multiuse agricultural landscapes
• Uses a participatory approach to rapidly assess changes in ecosystem services
• Assesses the impact of these changes on livelihoods

https://cgpace.cgiar.org/handle/10568/77762
Participatory mapping of ecosystem services

**APPROACH**

Rapid spatial assessment of the condition and trends in ecosystem service provision across landscapes

**METHODS**

High resolution imagery, farming communities map and explain changes in ecosystem service provision

Can feed into scenario development, targeting, development and landscape planning
The steps

- Community groups of men, women and youth
- High resolution maps from Google Earth Pro

Questions

- Where is this resource?
- Have there been any changes in the resource?
- What do you think is driving these changes?
- How do these changes affect your lives?
- How often are you accessing this resource?
- Who has access to this resource - are there any restrictions?
<table>
<thead>
<tr>
<th>What information can these maps generate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystem service assessment</td>
</tr>
<tr>
<td>Demonstrate patterns for further investigation</td>
</tr>
<tr>
<td>Maps of ecosystem service provision</td>
</tr>
<tr>
<td>Hotspots of ecosystem service decline</td>
</tr>
<tr>
<td>Areas where conflicts arise over different resources</td>
</tr>
<tr>
<td>Differences in landuse between men, women and youth</td>
</tr>
</tbody>
</table>
# Ecosystem services used across the landscape - summarised across villages for each country

<table>
<thead>
<tr>
<th>Ecosystem services</th>
<th>Tanzania</th>
<th>Malawi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cultivated areas</td>
<td>forests</td>
</tr>
<tr>
<td>Provisioning</td>
<td>Crop production <em>Soil fertility (nutrient regulation)</em></td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Livestock production</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Wild vegetables and fruit (mushrooms, wild fruit, wild vegetables)</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Water quantity and quality (Domestic, irrigation, livestock)</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Bushmeat, fish</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Fuelwood</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Charcoal</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Timber/poles</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Fodder</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Thatch</td>
<td>↑</td>
</tr>
<tr>
<td>Material for weaving</td>
<td></td>
<td>↓</td>
</tr>
<tr>
<td>Regulating</td>
<td>Climate regulation</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Erosion regulation</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Flood control</td>
<td>↓</td>
</tr>
<tr>
<td>Cultural</td>
<td>Tourism</td>
<td>→</td>
</tr>
<tr>
<td></td>
<td>Spiritual and religious</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Sand mining</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clay for pots</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Bricks for houses</td>
<td>↓</td>
</tr>
<tr>
<td></td>
<td>Quarry for stones</td>
<td>→</td>
</tr>
</tbody>
</table>

Shows the various ways communities use different areas in their landscape

The arrows show whether an ecosystem service was declining, increasing or had not changed over time

The green boxes show those resources that people use to generate income

These include multiple off-farm sources
The red boxes show the resources that community members now have to buy because their natural supply is dwindling.

People are spending money on resources they used to access for free.

There is less money available for investing in on-farm management.
Mapping land access and soil status

Four villages - different resources available to each

Legend
- Mpulula renting out
- Malaswa renting out
- Kapalula renting from
- Gwauyu renting from
- Soil erosion hotspots
- Termite hotspots
- Waterlogged soil

Erosion & termite hotspots and relationship to land rental patterns
Land access and soil status implications

Gwauyu does not have enough land so farmers have to rent from surrounding villages.

Land leased out by villagers in Malaswa and Mpulula villages is often waterlogged, eroded or infested with termites.

Malaswa and Mpulula villages have new land available for cultivation in the forest.

Even within a 4 km² landscape communities have different challenges to investing in soil management.
Newly cultivated areas overlap grazing and forest areas

Areas at risk from over use that need to be managed to ensure that communities continue to benefit from the goods and services from uncultivated areas
Diverse perceptions and impacts

Mapping with different groups (men, women and youth) illuminates differences in importance, access and perceptions of change of resources.

In Tanzania, women said that dry season scarcity of water meant they could spend an extra 2-3 hours a day fetching water. These women are unable carry out their daily activities normally in the dry season.

In Malawi, the youth identified new plots along the river and wetland while the older men and women said there were no newly cultivated areas. The youth are under pressure to find scarce farmland and may need targeted land management or livelihood alternatives to conserve forest and wetland areas.
Conclusions

• This approach identifies **who has a stake** in any changes in land management

• These changes will impact users’ **access to resources** or require **adoption** of certain natural resource management practices

• Need solutions that are **locally relevant** and likely to be accepted by local communities

• Identify areas where **investment may be necessary** to enhance ecosystem service benefits and sustained improvement in livelihoods
Thank you, Asante, Zikomo

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