Mapping uneven impacts of coastal degradation: Local knowledge as a pathway to equitable ocean governance in Inhambane Bay, Mozambique

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Key Findings

- Foot-based users, who are primarily women, are disproportionately exposed to seagrass loss.
- Dependence on seagrass varies by community, rather than gear type.
- Local knowledge uncovers patterns of social impacts missing in official data.
- National data systems can better reflect these realities via four connected pathways.

Background

Ocean planning and management rarely captures the diverse ways communities depend on marine ecosystems and are impacted by change. For example, seagrass meadows in Inhambane Bay have undergone significant decline over the past 40 years, but impacts on different user groups are poorly understood. Local knowledge offers a critical — and currently underused — evidence base for identifying social impacts of such change.

Objectives

- **Create an adaptable framework** to better incorporate community knowledge and social impacts directly into ocean governance.
- **Apply in Inhambane Bay**, **Mozambique** with 6 communities to assess social impacts of seagrass loss across fisheries user groups
- **Evaluate gaps between community knowledge systems and existing planning datasets, and develop recommendations** for embedding the framework into national ocean governance

Methodology

- **Conducted participatory mapping** to generate spatially explicit data on: (1) community knowledge of seagrass loss, (2) use of coastal areas, and (3) resource dependence.
- **Calculated exposure & sensitivity** to evaluate potential social impacts and assessed explanatory power using regression and ANOVA models.
- **Compared against national socioeconomic dataset** used in ocean accounting in Mozambique (2022 Family Budget Survey; IOF).

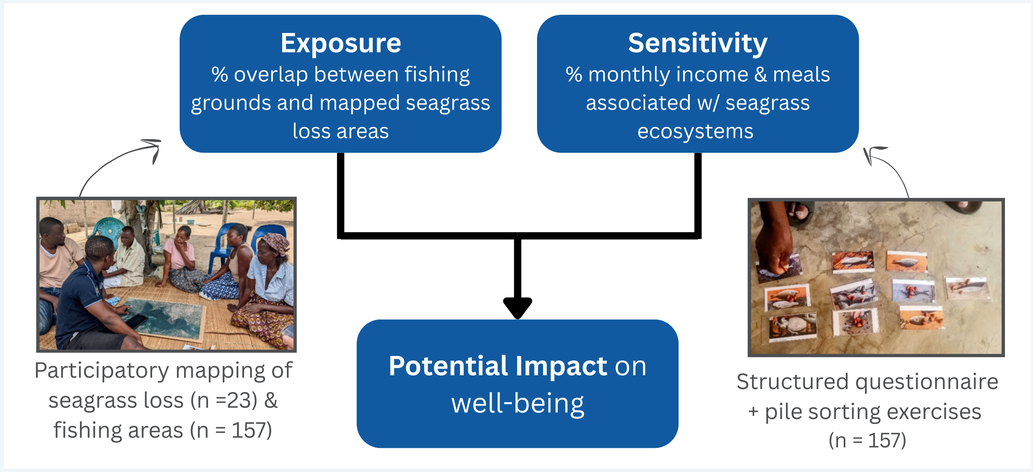


Figure 1: Framework and indicators for assessing the potential impacts of seagrass loss on fishing user groups, measured using participatory mapping and structured surveys with pile sorting (see photos).

Results

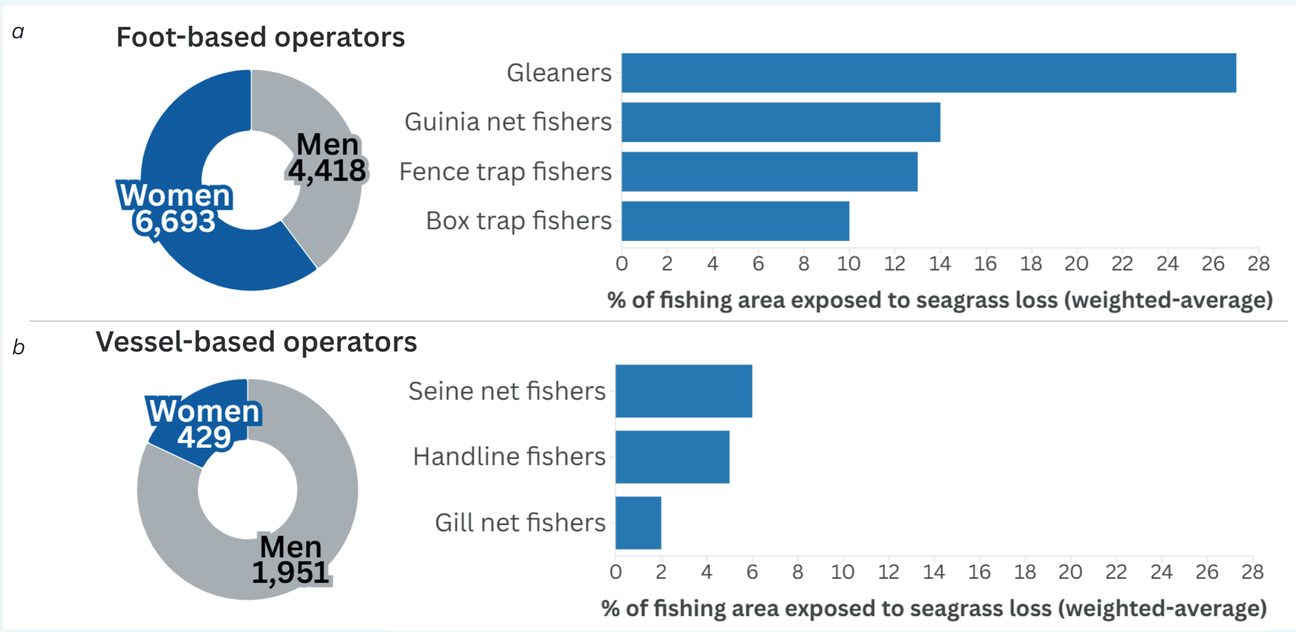


Figure 2: Gender composition (left) and exposure to seagrass loss (right), by (a) foot-based and (b) vessel-based operators.

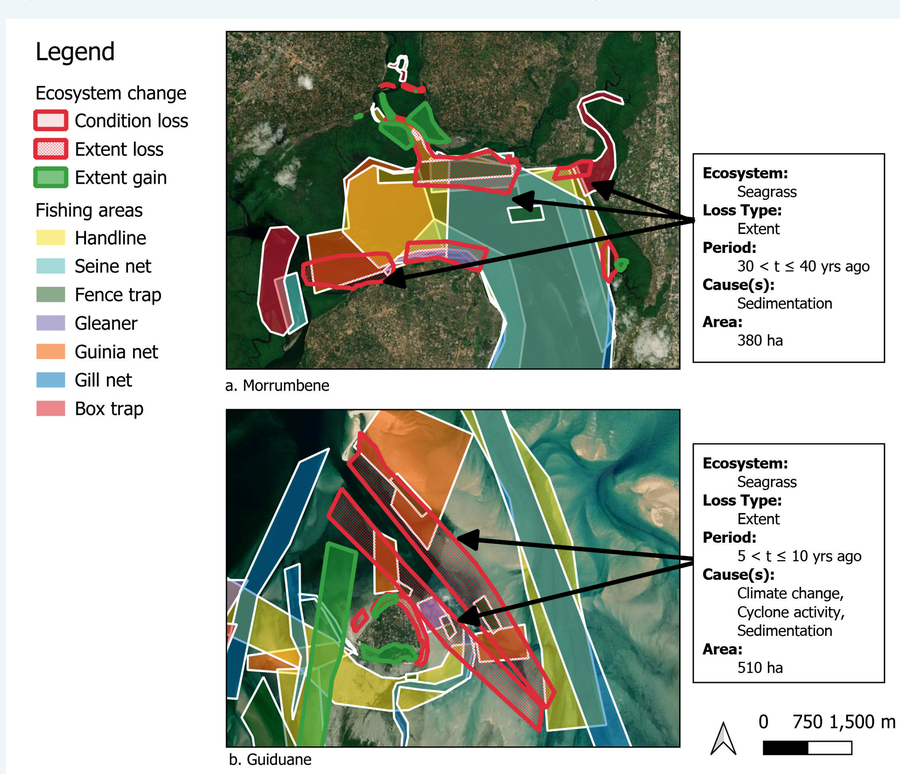
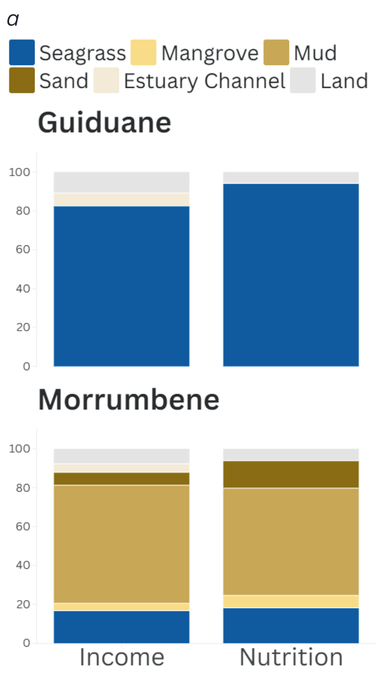


Figure 3: Overlay of seagrass change areas and fishing grounds in selected communities, (a) Morrumbene and (b) Guiduane. Callouts show attributes of selected areas of loss.



b

Community	User Group	N	Exposure to seagrass (SG) loss: Fishing area SG loss (%)	Sensitivity to seagrass (SG) loss: Income SG (%)	Sensitivity to seagrass (SG) loss: Protein meals SG (%)
Guiduane	Gleaner	87	91	90	97
	Fence trap fisher	10	80	85	96
	Guinia net fisher	460	28	90	93
Morrumbene	Gleaner	185	84	0	10
	Fence trap fisher	130	67	0	3
	Guinia net fisher	243	35	0	13

Figure 4: Measures of sensitivity for selected communities, Guiduane (top) and Morrumbene (bottom). (a) Stacked bar charts showing the population weighted share of fishers' income and protein meals which are associated with catch from different marine ecosystems and (b) indicators of social impact for the three most exposed user groups in each community. SG = seagrass.

Discussion

Exposure is gendered: Foot-based fishers (gleaners, guinia net, fence trap), majority of whom are women, have the highest spatial overlap with seagrass loss.

Why does this matter?

- Foot-based fishing groups (e.g. gleaning) are absent or underrepresented in national fisheries data.
- National socioeconomic surveys like the IOF do not distinguish between fisheries livelihoods (e.g. marine vs inland; foot-based vs. vessel-based).

Community level patterns drive sensitivity: Fishers' community, rather than their gear, determine ecosystem dependence and therefore sensitivity to seagrass loss.

Why does this matter?

- National fisheries data are often analyzed at the district level & do not capture information related to local/target ecosystems.
- National socioeconomic surveys (like the IOF) are conducted at the provincial level, obscuring community level patterns.

Recommendations

1. **Strengthen socioeconomic surveys for coastal contexts:** Expand sampling to district level with coastal stratification, and adopt classifications for fisheries livelihoods and target ecosystems.
2. **Integrate data across statistics offices and fisheries agencies:** Improve interoperability between activity, consumption, and ecosystem classifications across fisheries and socioeconomic surveys.
3. **Fill gender-based data gaps in fisheries monitoring:** Fully include non-vessel & post-harvest operators in fisheries survey instruments.
4. **Embed participatory and spatial data collection into national systems:** Expand key informant approaches within fisheries, adopt digital spatial survey tools, and formalize community-government data partnerships (built around local bodies like Community Fisheries Councils (CCPs)).

Acknowledgement

The authors gratefully acknowledge funding from the Global Ocean Accounts Partnership through funding from the UK Department for Environment, Food & Rural Affairs (DEFRA) Blue Planet Fund.