Assessing the impact of road on plant species diversity in the Moribane Forest Reserve, Chimanimani mountain landscape

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Why this study?

• Roads are vital for maintaining development and economic activity, but their impacts on plant species diversity remain largely unquantified and poorly understood.

• This is especially true in the context of sub-Saharan Africa, where transport infrastructure is growing faster and it has a complex intimate relationship with land-use system.

• In Mozambique, roads are the primary transport mode, accounting for half of the freight traffic and 98% of passenger traffic. The government has been receiving enormous road rehabilitation investments, construction, maintenance, and upgrading.

• This study was conducted to assess the role that roads play on plant species diversity compare to other land-use types in the Moribane Forest Reserve (MFR).
Land-use system layout in MFR
Research questions

• How species diversity varying among land-uses comparing to road N216 in MFR.

• What is the role of the road N216 on plant species diversity conservation.
Methodology

- We conducted 45 transects along the roadside.
- Established randomly 24 quadrats in the agriculture plots and fallow, and 26 quadrats in the pristine forest.
- Recording the occurrence of four plant life forms (trees, shrubs, herbaceous, and grass species).
- To determine the alpha and beta-diversity across land-uses.
Results (1)
Species richness and invasiveness

<table>
<thead>
<tr>
<th>Land-use</th>
<th>Total species</th>
<th>Invasive species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadside</td>
<td>138</td>
<td>31</td>
</tr>
<tr>
<td>Fallow</td>
<td>81</td>
<td>20</td>
</tr>
<tr>
<td>Forest</td>
<td>78</td>
<td>19</td>
</tr>
<tr>
<td>Agriculture</td>
<td>72</td>
<td>31</td>
</tr>
</tbody>
</table>
Results (2)
Species diversity among land-uses

(A) Regenerated tree species

(B) Regenerated shrub species

(C) Herbaceous species

(D) Grass species
Results (3)
Sampling coverage

(A) Regenerated tree species

(B) Regenerated shrub species

(C) Herbaceous species

(D) Grass species
Results (4)
Dissimilarity of Plant life form among land-uses

<table>
<thead>
<tr>
<th>Plants</th>
<th>Total species</th>
<th>Endemic (%)</th>
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<tbody>
<tr>
<td>Trees</td>
<td>43</td>
<td>49</td>
</tr>
<tr>
<td>Shrubs</td>
<td>51</td>
<td>21</td>
</tr>
<tr>
<td>Herbs</td>
<td>84</td>
<td>36</td>
</tr>
<tr>
<td>Grass</td>
<td>34</td>
<td>41</td>
</tr>
</tbody>
</table>

a) Regenerated tree species
b) Regenerated shrub species
c) Herbaceous species
d) Grass species
Results (5)
Dissimilarity of Plant life form

- The dissimilarity of land-uses is due to the effect of turnover instead of nestedness patterns.
Conclusion

Taken together, this result suggests that:

- Analysis that includes roads as a land-use type provides a more quantifiable measure of the impact of land-use on biodiversity where intimate relationship between roads and other anthropogenic land-use are evident.

- Roads can play a significant role in species conservation as linear ecosystems in the mountain landscape area, causing likely a trade-off of tree species between roadside and land-uses (i.e., agriculture).

- This study exposes and promotes the need to explore more in this nascent field in Mozambique.

- *V. phosphorica* is the most common invasive alien species in the study area recorded mostly in the roadside and Fallow.

- This research will contribute to a deeper understanding of the impacts of roads on plant species diversity in the mountain landscape, which are targets of intensified human land-use.
## Assessing the impact of road on plant species diversity in the Moribane Forest Reserve, Chimanimani mountain landscape

---Manuscript Draft---

<table>
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<td>Abstract:</td>
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Kittus Paliu

Obrigado!