Mitigating Extinction Risk: The Crucial Role of Agriculture in Guatemala

J. Andrés Rodríguez Z.[1], Randall Jiménez[1], Nicholas Macfarlane[1], Thomas Brooks[1] & Guillermo Putzeys[1]

[1]International Union for Conservation of Nature, IUCN; *andres.rodriguez@iucn.org*

Introduction

The Kunming-Montreal Global Biodiversity Framework (GBF) states:

- Goal A is to reduce the species extinction rate tenfold.
- Target 4 urges management actions to halt and significantly reduce human-induced extinction of threatened species.

As a major threat driving species extinction risk, agriculture presents an opportunity to act. However, quantifying, mapping, and reporting the impacts of conservation actions remains a challenge[1,2].

Results: Land uses

Agricultural land use categories[3] accounted for 39% of the country´s extent. Pasture and herbaceous crops comprise 78% of all agricultural land uses and 30% of the national extent. Shrub and arboreous crops represent 12 and 7% of the agricultural landscape in Guatemala. Agroforestry systems in Guatemala corresponded to 3% of all agricultural land (1% of the national extent) (Figure 2).

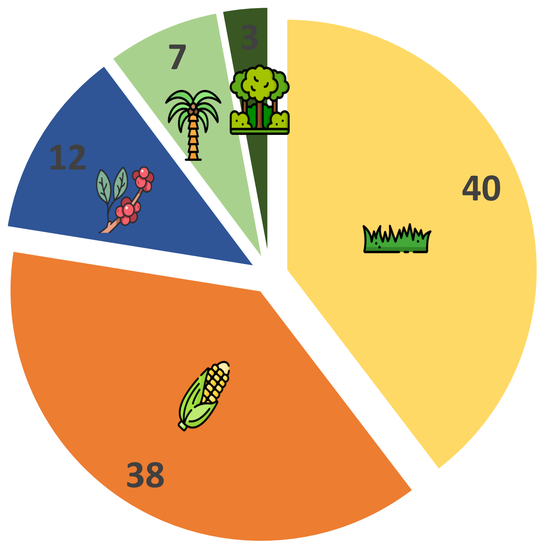


Figure 2: Proportion of agricultural land use categories in Guatemala. Source: MAGA 2020[2].

Total STAR threat abatement score ($STAR_T$ score) for Guatemala was 16,478.69. Guatemala´s $STAR_T$ score as a proportion of Americas' total $STAR_T$ score represents 3.02%. Departments in the south and along the pacific coast showed lower scores, whereas departments in the centre of the country presented the highest scores (coincidently with the Altiplano). The department of Petén showed intermediate to low STAR scores (lowlands) (Figure 3).

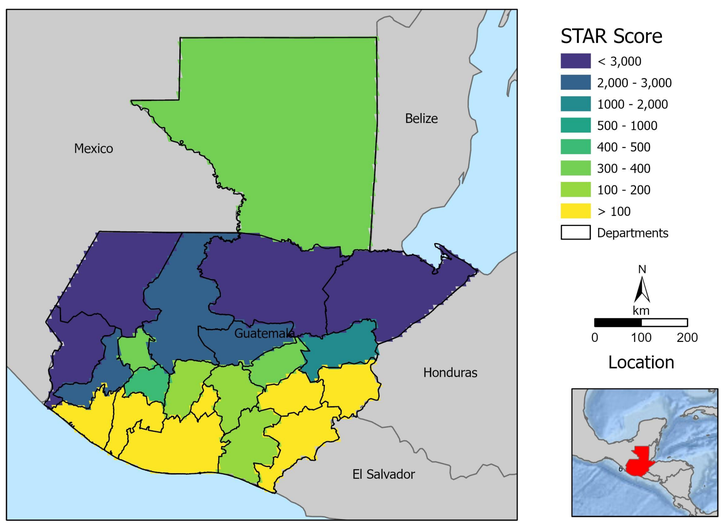
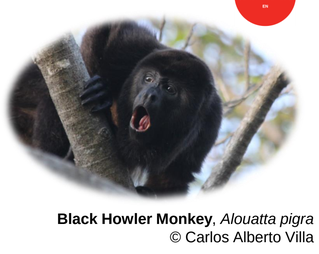


Figure 3. Total $STAR_T$ score obtained for each department in Guatemala. Source: IUCN STAR metric.

Azure-rumped Tanager, *Poecilostreptus cabanisi* ML565836461



Black Howler Monkey, *Alouatta pigra*
© Carlos Alberto Villa

Methods

Agricultural land use categories:

- Herbaceous crops
- Agroforestry
- Pasture
- Arboreous crops
- Shrub crops

IUCN Species Threat Abatement and Restoration metric: STAR

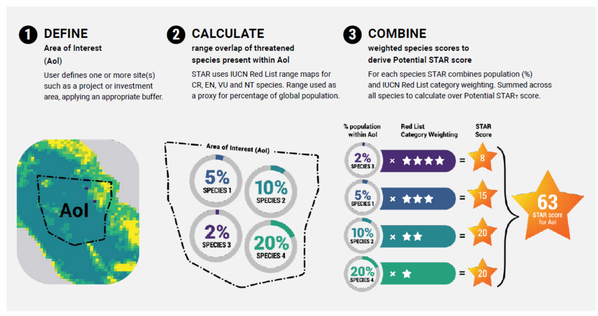


Figure 1. IUCN STAR metric calculation process for an area of interest (AoI). Scores are calculated using proportion of species range within the AoI and a Red List category weighting factor.

Results: $STAR_T$ Scores

Herbaceous and shrub crops contributed with the largest proportion of $STAR_T$ score at the national level (Figure 4).

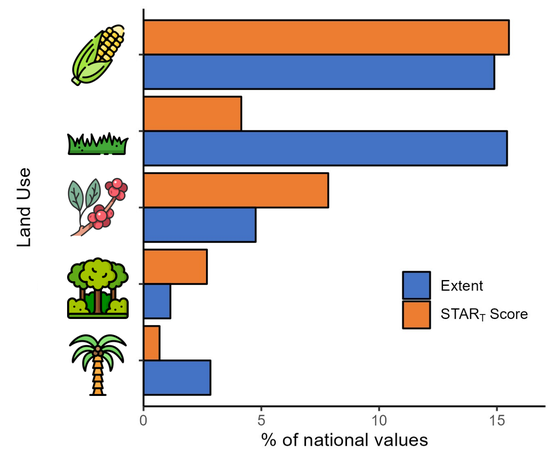


Figure 4. Proportional $STAR_T$ scores and extent for different land use categories relative to national values in the agricultural landscape of Guatemala

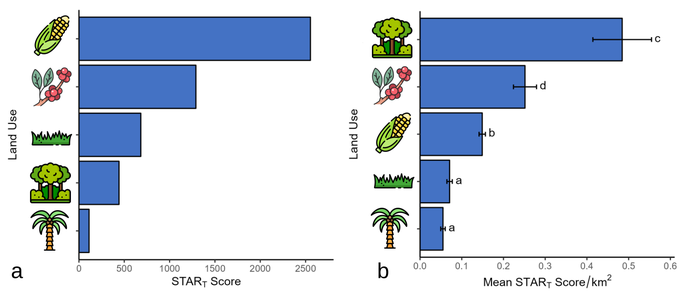


Figure 5. a) Total $STAR_T$ scores and b) mean $STAR_T$ scores per km^2 for agricultural land use categories in Guatemala. In b) different letters mean statistically significant differences in mean values ± standard error ($p<0.05$). Source: IUCN STAR metric.

Total $STAR_T$ score for agricultural land uses was 5,065.3 (30.8% of Guatemala´s score). Herbaceous crops showed the highest $STAR_T$ score, followed by shrub type crops, pasture, agroforestry and arboreous crops (Figure 5a). $STAR_T$ scores standardized by area unit showed agroforestry systems had the highest mean $STAR_T$ score per km^2, followed by shrub and herbaceous crops. Pasture and arboreous crops showed the lowest scores (Figure 5b).

Key messages

- 30.8% of the potential contribution to reducing species extinction risk in Guatemala can be achieved by acting in the agricultural landscape.
- Management actions in crops like corn, beans, coffee and pastures could significantly contribute to reducing extinction risk of threatened species in Guatemala.
- The STAR metric contributes to identify priority areas for conservation actions by spatially mapping the risk of extinction.
- 70% of the potential contribution to reducing species extinction risk in Guatemala can be achieved by tackling threats from agriculture, logging, and urbanization.

Results: Spatial distribution

The spatial identification of high $STAR_T$ scores signals areas within crop systems where management actions could have greater impacts to reducing extinction risk of threatened species (Figure 6).

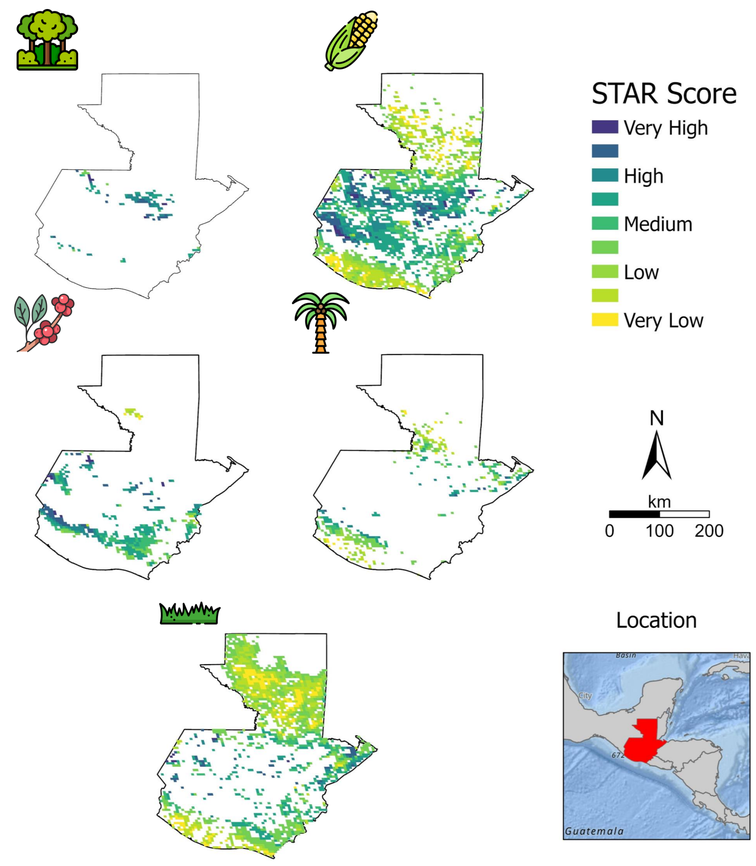


Figure 6: Spatial distribution of $STAR_T$ scores from agricultural land uses in Guatemala.

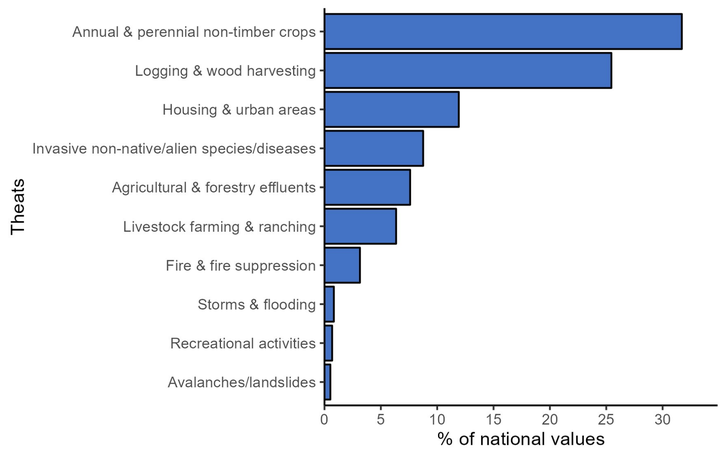


Figure 7: Major threats driving species extinction risk in Guatemala given by higher $STAR_T$ scores relative to national values.

Amphibians accounted for 90% of the total $STAR_T$ score in Guatemala, followed by mammals (7%) and birds (3%). Three major threats driving species extinction risk in Guatemala accounted for almost 70% of the national $STAR_T$ scores: annual and perennial non-timber crops, logging and wood harvesting, and housing and urban areas. (Figure 7).

References

[1] IPBES. 2019. Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services (IPBES, 2019).

[2] Mair, L., Bennun, L. A., Brooks, T. M., Butchart, S. H., Bolam, F. C., Burgess, N. D., ... & McGowan, P. J. (2021). A metric for spatially explicit contributions to science-based species targets. Nature Ecology & Evolution, 5(6), 836-844.

[3] MAGA. 2020. Mapa de Cobertura Vegetal y Uso de la Tierra, a escala 1: 50,000 de la República de Guatemala. Año 2020. Ministerio de Agricultura, Ganadería y Alimentación. Guatemala.

Supported by the

Federal Ministry for Economic Cooperation and Development

DAAD Deutscher Akademischer Austauschdienst German Academic Exchange Service

Technology Arts Sciences TH Köln