



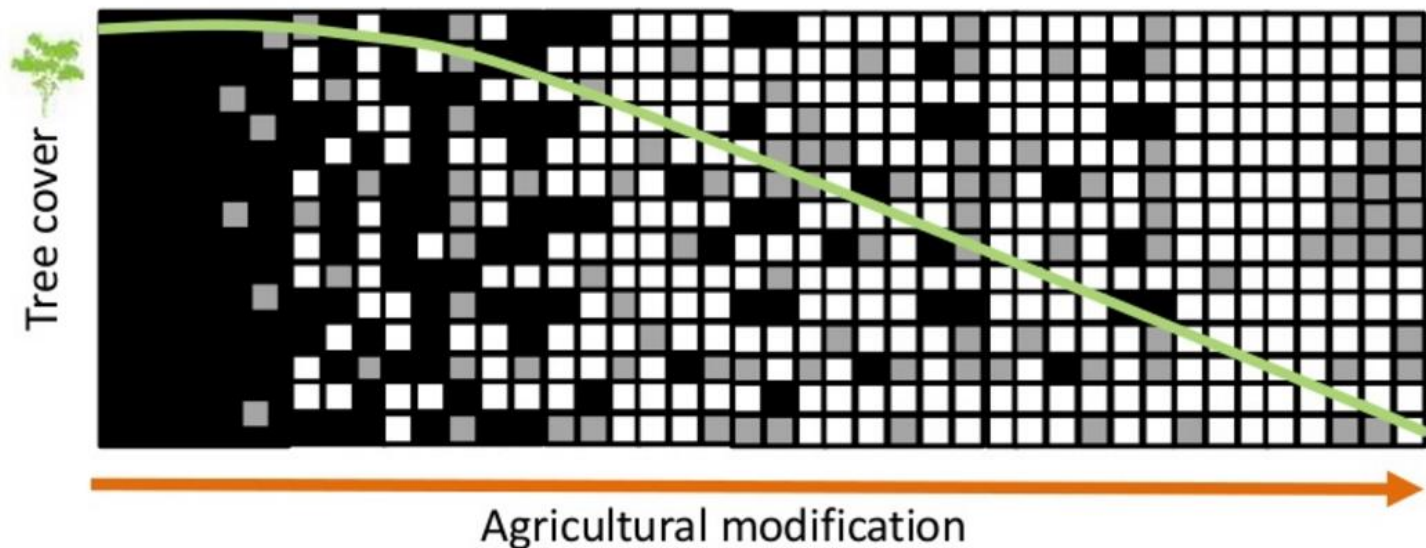
# **Forest foods and healthy diets: quantifying the contributions**

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# Context: Forests and Trees in Multi-Functional, Nutrition-Sensitive Landscapes



■ Natural vegetation



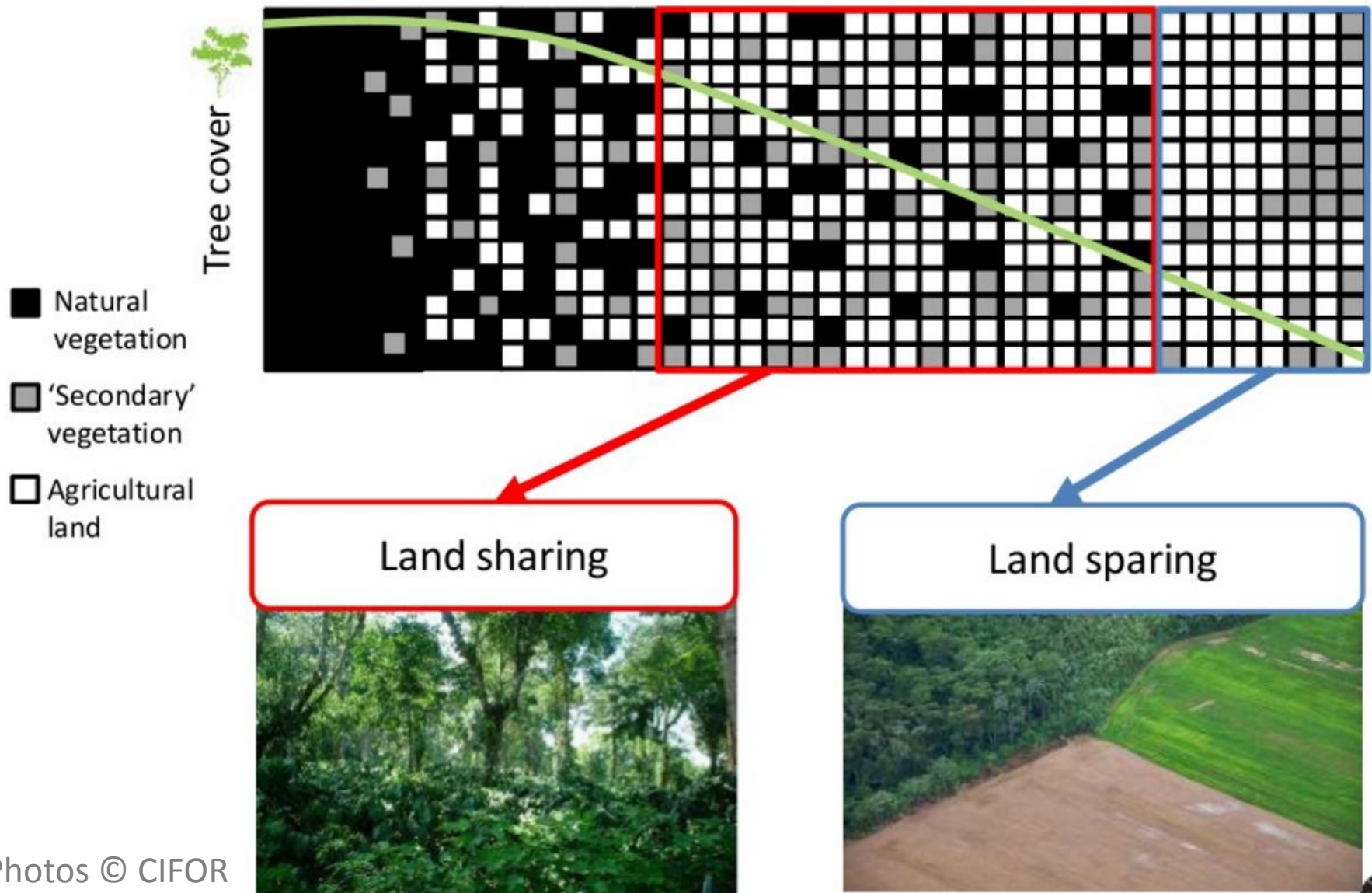
■ 'Secondary' vegetation



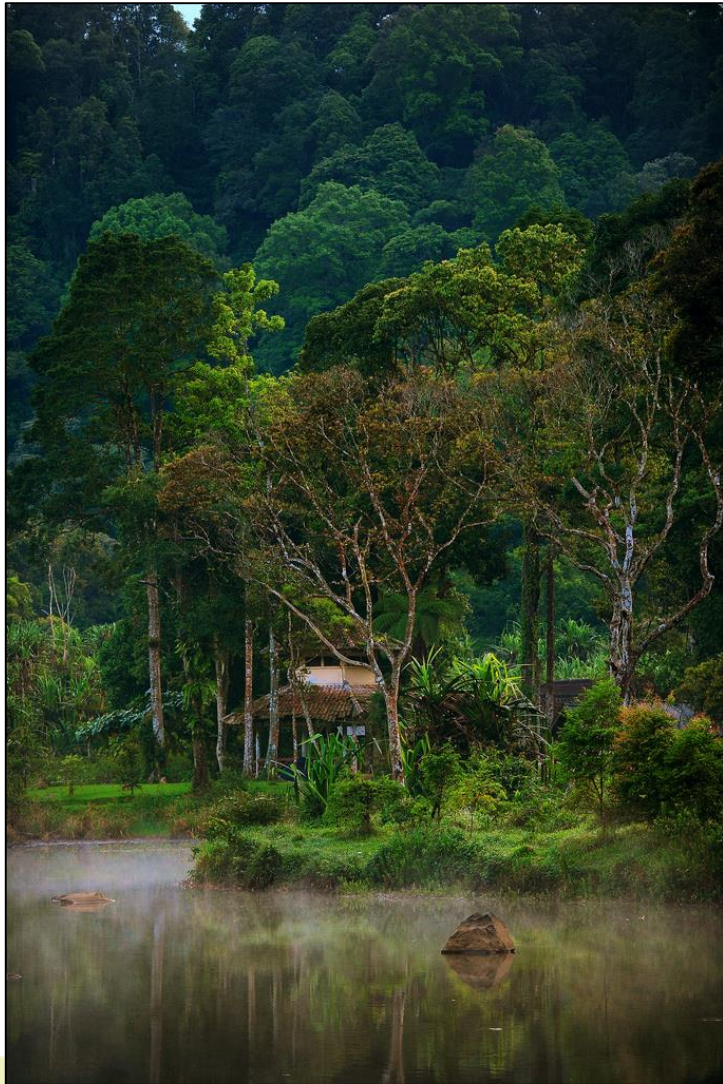
□ Agricultural land



# Context: Multi-Functional Landscapes



# Why might forests and tree-filled landscapes be important for dietary quality?



- Collection of nutritious NTFPs
- Farming mosaics may promote more diverse diets
- Agro-forestry and fruit production
- Ecosystem services of forests for agriculture
- Availability of fuel wood
- May provide 'safety net' foods for lean season

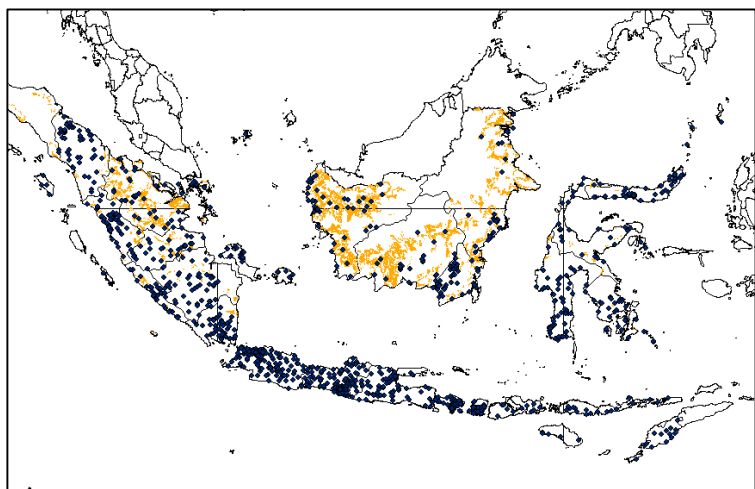
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# Is there evidence?



## Intriguing Correlations

- Johnson et al. (2013) finds net forest loss associated with decreased dietary diversity and higher forest cover associated with increased consumption of vitamin-A rich foods
- Ickowitz et al. (2014) finds a positive correlation between tree cover and dietary diversity and consumption of fruits and vegetables across 21 African Countries
- Ickowitz et al. (2016) Finds tree-dominated land classes associated with increased consumption of micronutrient rich foods in Indonesia – with greatest effects in swidden agriculture land classes

# Is there evidence?

## Case Studies

- Golden et al. (2011): without consumption of bushmeat in Madagascar, there would be an 29% increase in the prevalence of anemia in children.
- Termote et al.(2012): Wild foods from biodiversity nutrient rich but under utilized in DRC. Current levels of consumption do significantly contribute to dietary adequacy.
- Powell et al. (2013): Wild foods nutritionally important but wild foods from agricultural land is more important than from forests in East Usambara Mountains, Tanzania.

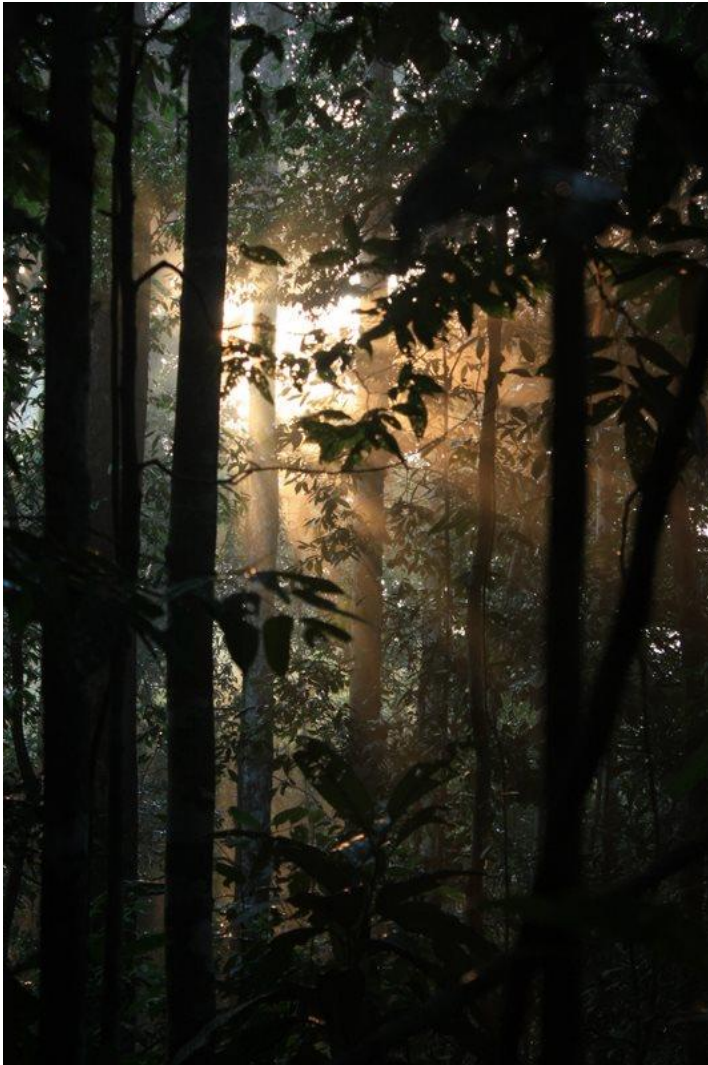


# Multi-country case study analysis

- Rowland, D., Ickowitz, A., Powell, B., Nasi, R., and Sunderland, T. (2016) *Environmental Conservation* doi:10.1017/S0376892916000151
- Data from the Poverty and Environment Network (PEN) from 37 sites in 24 tropical countries.
- Not nationally representative but sites selected to represent “small-holder dominated rural landscapes with at least some degree of access to forest resources”.
- Quarterly household surveys on agricultural, forest and non-forest environmental income and resource use.
- Using multiple assumptions and conversions – generated quantities of foods consumed for adult equivalents.
- Comparison of quantities of ‘meat and fish’ and ‘fruits and vegetables’ consumed from wild forest sources:
  - Against dietary guidelines/reference quantities and national average consumption patterns.
  - With agricultural sources of foods.
  - Site-level patterns of forest food use.



# Main Findings

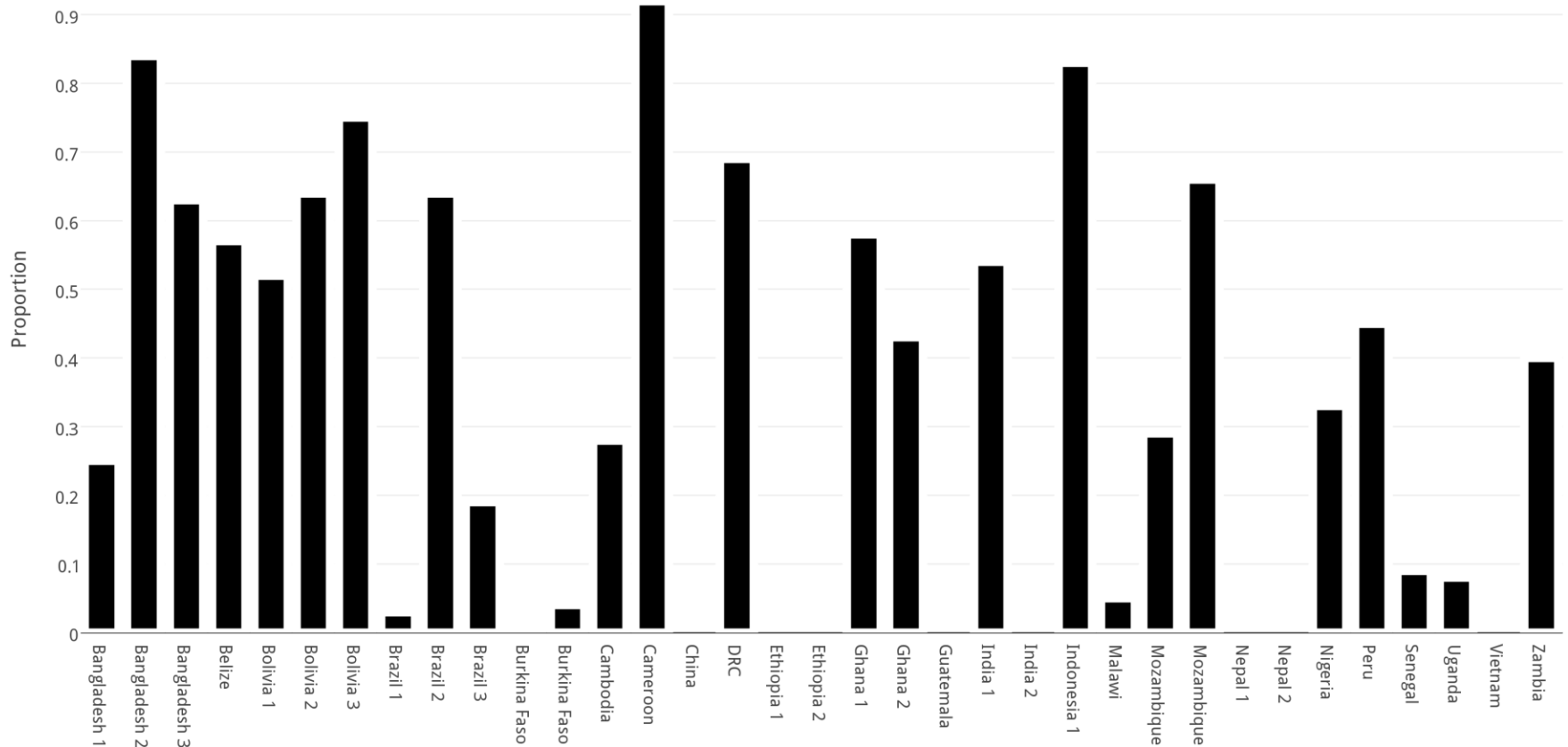


- Over half (53%) of households consumed one or more forest food.
- Average contributions of forest fruits and vegetables towards dietary guidelines low (4%) for forest food using households. For top quartile of users 15%.
- Average contributions of forest meat and fish towards dietary guidelines higher (25%) for forest food using households. For top quartile of users 140%.
- Highly heterogeneous consumption patterns both within and between sites.



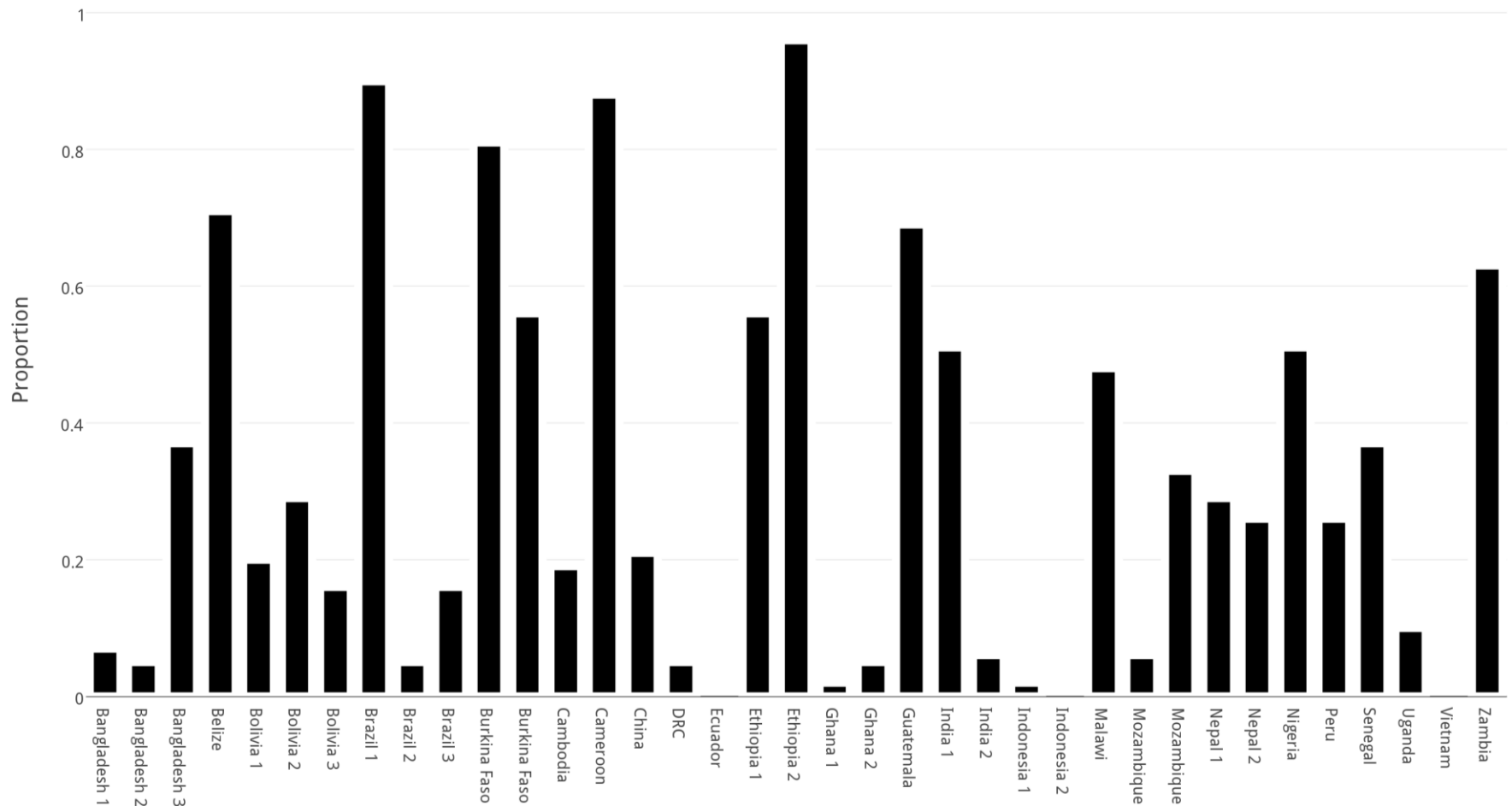
# Importance of forests as a food source relative to agriculture

Proportion of non-purchased meat and fish coming from forests



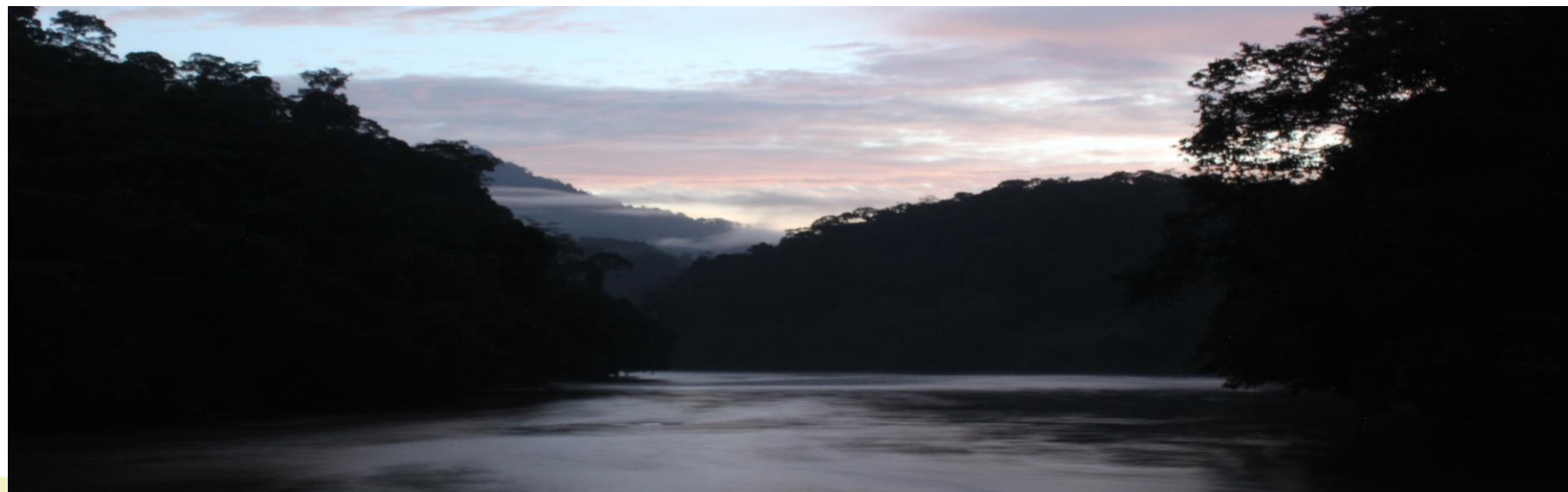
# Importance of forests as a food source relative to agriculture

Proportion of non-purchased fruits and vegetables coming from forests



## Site-level forest food use typologies

<i>Site typology</i>	<i>Description</i>	<i>Example sites</i>
Forest food dependent	Widespread, high level forest food consumption	Bangladesh, Belize, Brazil 1, Brazil 2, Bolivia 2, Bolivia 3, Cameroon, Mozambique, Zambia
Limited forest food use	Low–medium prevalence of forest food use in low quantities	India 2, Ethiopia 1, Burkina Faso 2, Guatemala, DRC, Ghana 1, Ghana 2, Nigeria, Nepal 2
Forest food supplementation	Widespread, low level consumption	Bolivia 1, Cambodia, Ethiopia 2, Malawi, Nepal 1, Senegal, Uganda
Specialist forest food consumers	Low–medium level prevalence with low–medium average consumption levels, combined with a small subset of households engaged in high level forest food consumption	Bangladesh 1, Brazil 3, India 1, Indonesia 1



# Conclusions

- Wild forest foods can and do play an important role in the diets of many people.
- But typically only important for high-level forest food users.
- The heterogeneous nature of forest food usage sheds lights on the mixed results seen in past individual case studies and highlights the need to take into account population-wide livelihood strategies.
- Forest food use and importance can not be separated from the wider agro-ecological, social, cultural, economic and political context.



## Limitations and Future Research



### Data and Study Limitations:

- Large number of assumptions and conversion required.
- Long recall periods means opportunistic and low-level consumption under-reported.
- May miss, over or under-report seasonal usage.
- Most opportunistic consumption probably by women and children.
- Absence of data on market-source foods.
- Lack of internationally recognized thresholds of “healthy diets”.
- Only wild forest foods, agro-diversity, agroforestry and other forest-based agriculture not included.

### Future studies should be:

- Dietary intake surveys taking into account all sources of foods and market access.
- Comparisons between forested and non-forested communities.

Golden, C. D., Fernald, L. C., Brashares, J. S., Rasolofoniaina, B. R., & Kremen, C. (2011). Benefits of wildlife consumption to child nutrition in a biodiversity hotspot. *Proceedings of the National Academy of Sciences*, 108(49), 19653-19656.

Ickowitz, A., Rowland, D., Powell, B., Salim, M. A., & Sunderland, T. (2016). Forests, Trees, and Micronutrient-Rich Food Consumption in Indonesia. *PloS one*, 11(5), e0154139.

Ickowitz, A., Powell, B., Salim, M. A., & Sunderland, T. C. (2014). Dietary quality and tree cover in Africa. *Global Environmental Change*, 24, 287-294.

Powell, B., Maundu, P., Kuhnlein, H. V., & Johns, T. (2013). Wild foods from farm and forest in the East Usambara Mountains, Tanzania. *Ecology of food and nutrition*, 52(6), 451-478.

Rowland, D., Ickowitz, A., Powell, B., Nasi, R., Sunderland, T (2016) Forest foods and healthy diets: quantifying the contributions. *Environmental Conservation* 00(0) 1-13 doi:10.1017/S0376892916000151

Termote, C., Meyi, M. B., Djailo, B. D. A., Huybregts, L., Lachat, C., Kolsteren, P., & Van Damme, P. (2012). A biodiverse rich environment does not contribute to a better diet: a case study from DR Congo. *PloS one*, 7(1), e30533.

# Thank you!



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