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Models that are simple, elegant and wrong: conceptual framing of the biodiversity food security nexus

Biodiversity and Food Security – From Trade-offs to Synergies
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Modelling biodiversity and food security

We require 'meaningful' conceptual models to manage socio-ecological systems to ensure the dual goals of food security and conservation biological diversity.

- Land sparing Vs land sharing
- Sustainable intensification

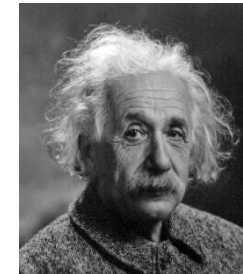


Two dictums for modelling the world

“The map is not the territory”
– **Alfred Korzybski**

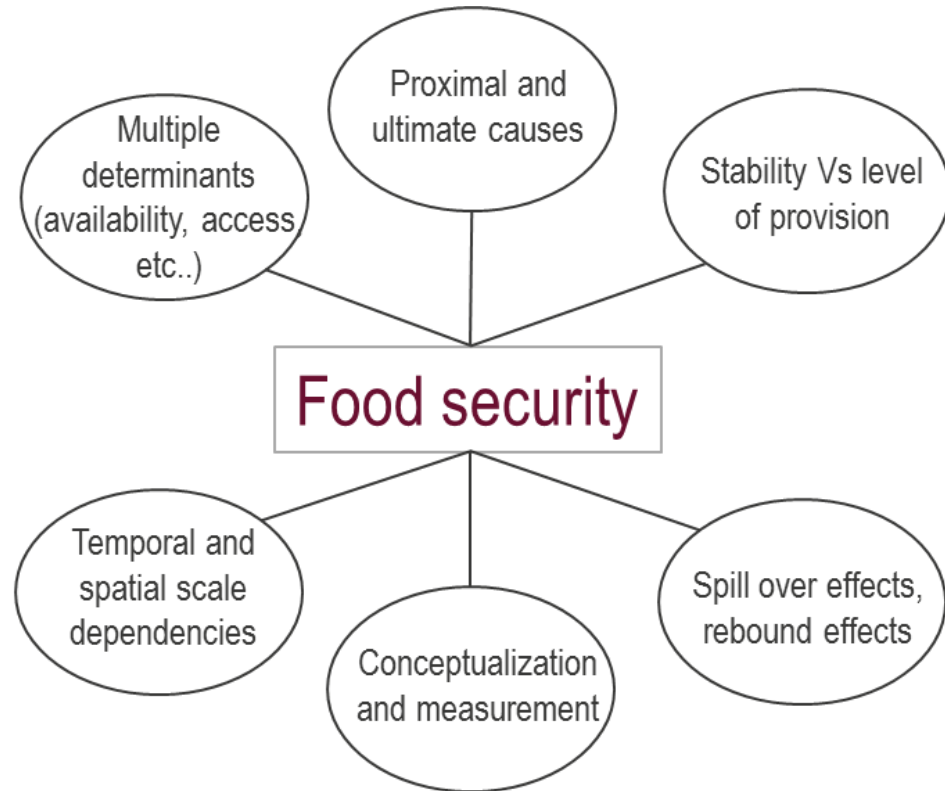
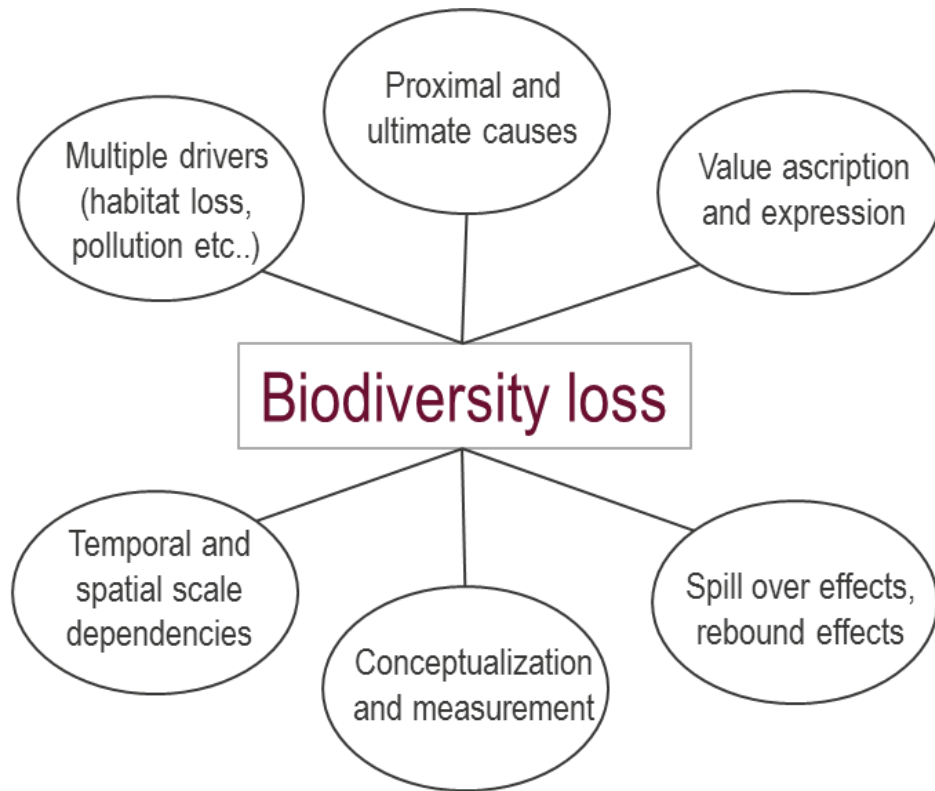


“Everything should be made as simple as possible, but no simpler”
– **Albert Einstein**

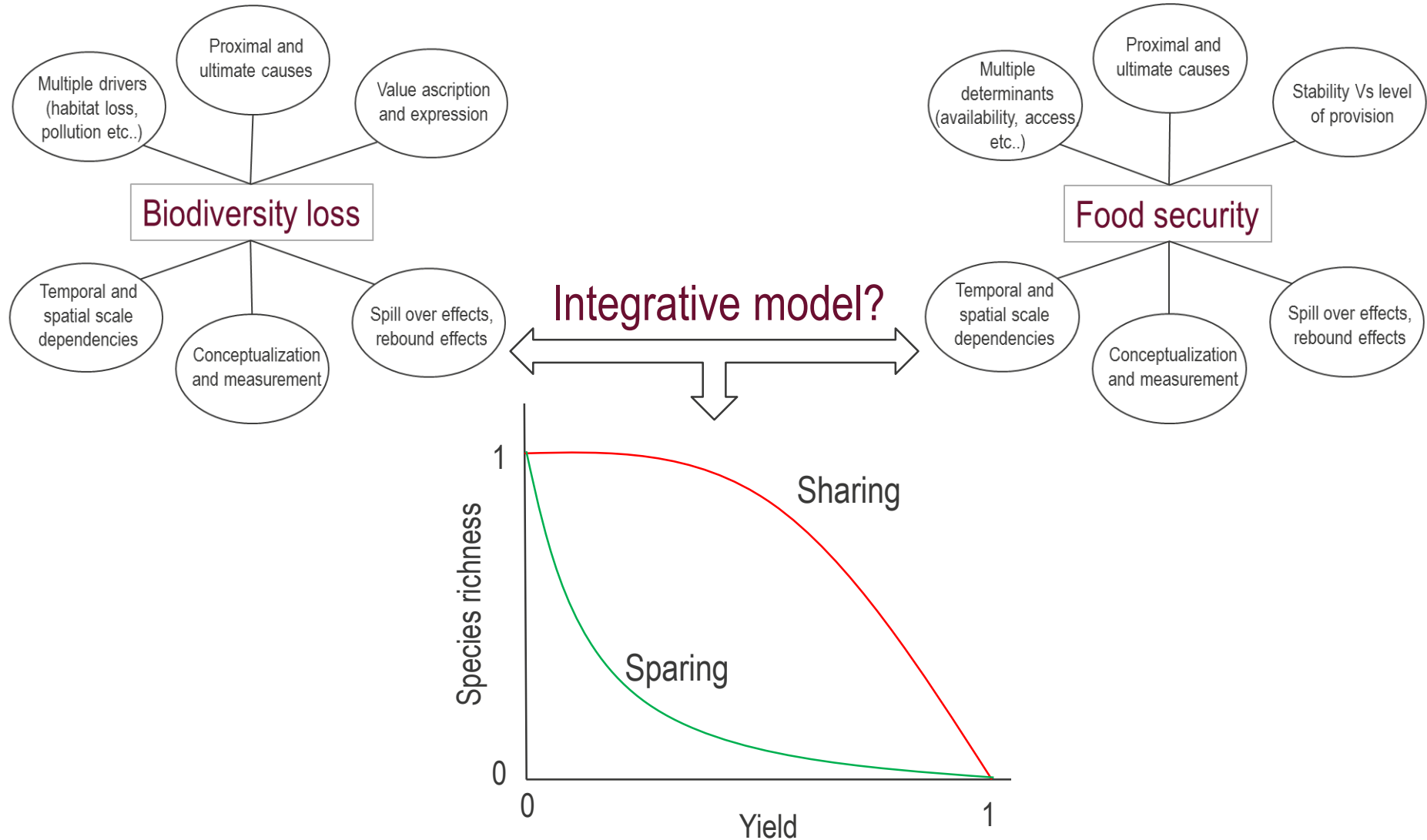


Biodiversity (loss)

Food Security

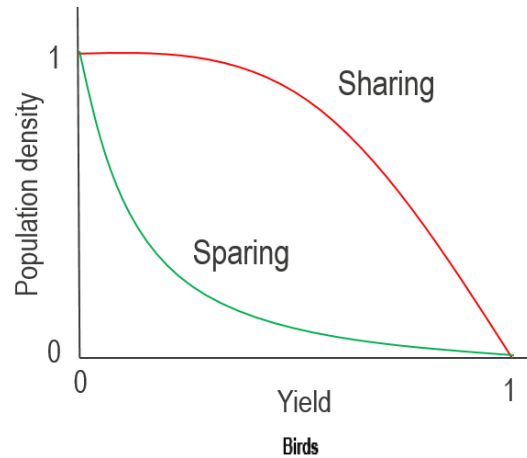


Land sparing Vs land sharing

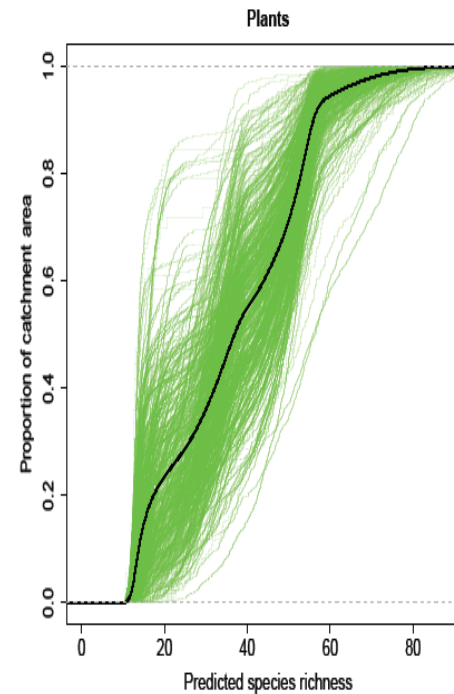
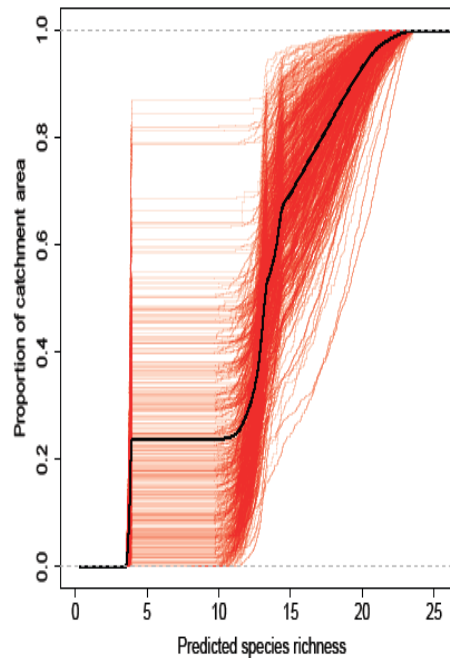
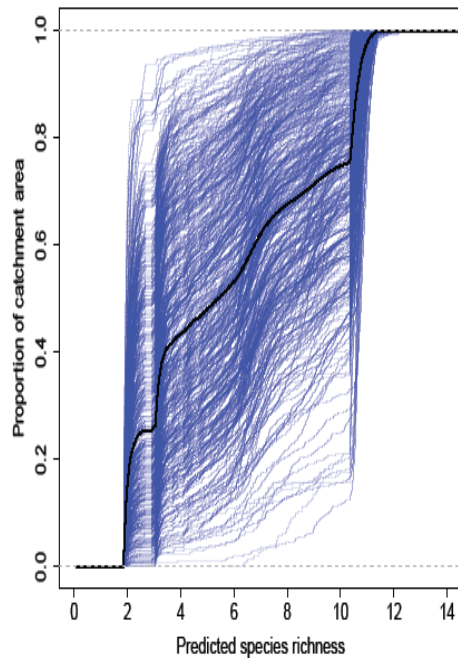


The basic land sparing/land sharing model (adapted from: Green et al., (2005) Dorrough et al., (2007); Phalan et al (2011))

Land sparing Vs land sharing

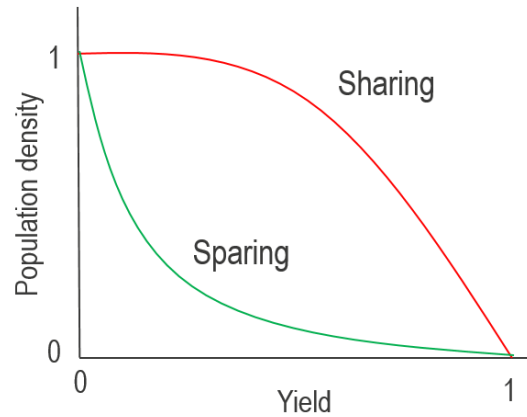


- Dichotomous



Hanspach et al (in prep) Species richness profiles for transylvanian village catchments across a 7440 km² study area.

Land sparing Vs land sharing



- Dichotomous
- Scale agnostic
- Static, optimization model
- Partial equilibrium assumptions
- Outcome rather than process oriented
- Implicitly normative

A simple, easy to understand model, suggesting generalizable policy recommendations, with a lack of regard for normative values and real world system dynamics



Sustainable Intensification

Seeks to achieve food security through an increase in production while minimizing negative environmental impacts and avoiding the expansion of land used for cultivation.

(e.g. Godfray *et al.* 2010; Garnett and Godfray 2012).

- Technocratic, outcome oriented
- Privileges yield increases as a solution to food insecurity
- Partial equilibrium model
- Fails to address key notions of sustainability (intra and inter-generational distributional and procedural justice)



Conclusions

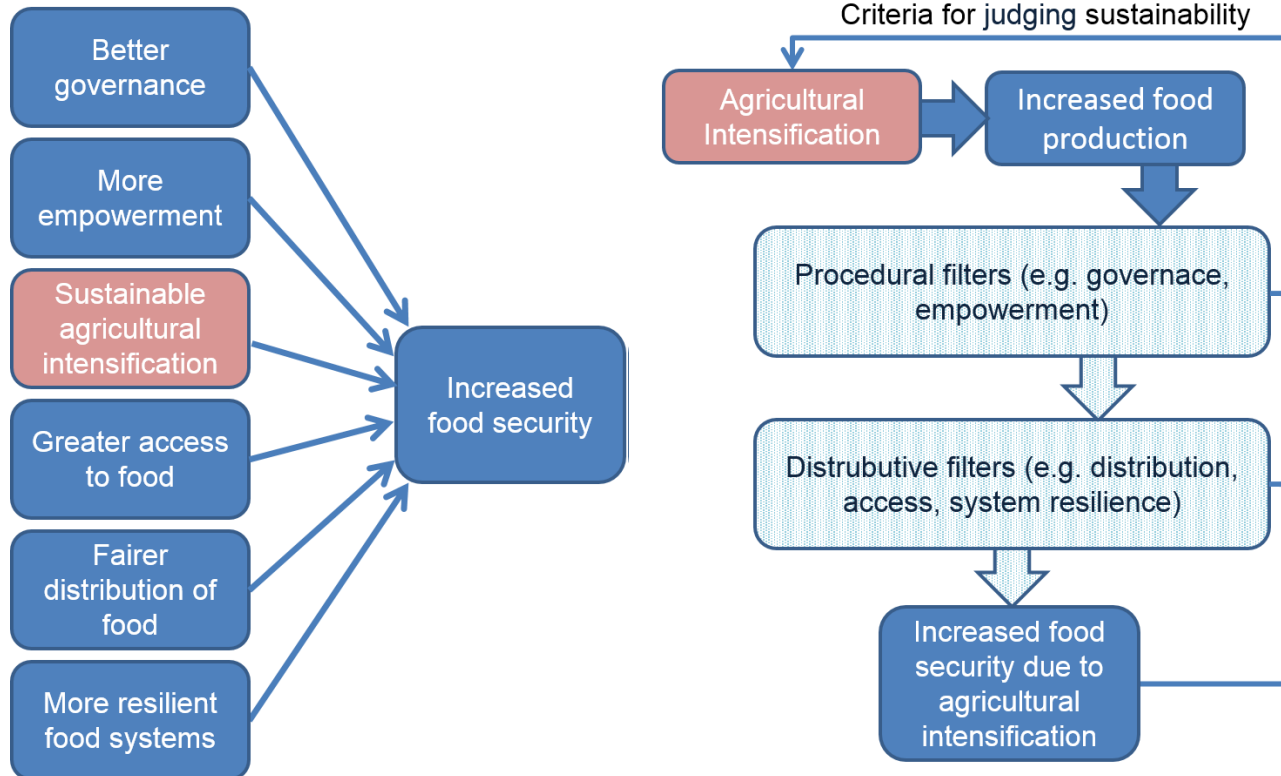
1. Considering yield-species richness relations is a necessary, but insufficient criteria for modelling the food security-biodiversity nexus.
 2. Conceptual models should acknowledge the normative and contextual nature of the problem, with the goal defining the model, not the model defining the goal.
- Fischer, J., Abson, D.J., Butsic, V., Chappell, M. J., Ekroos, J., Hanspach, J., Kuemmerle, T., Smith, H. G. and von Wehrden, H. (2014). Land sparing versus land sharing: moving forward. *Conservation Letters*, 7(3), 149-157.
 - Loos, J., Abson, D.J., Chappell, M.J., Hanspach, J., Mikulcak, F., Tichit, M., and Fischer, J (2014) Putting meaning back into “sustainable intensification”. *Frontiers in Ecology and Evolution*, 12, 356-361.



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Loos *et al.* (2014)