WALDDISKURS

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Background

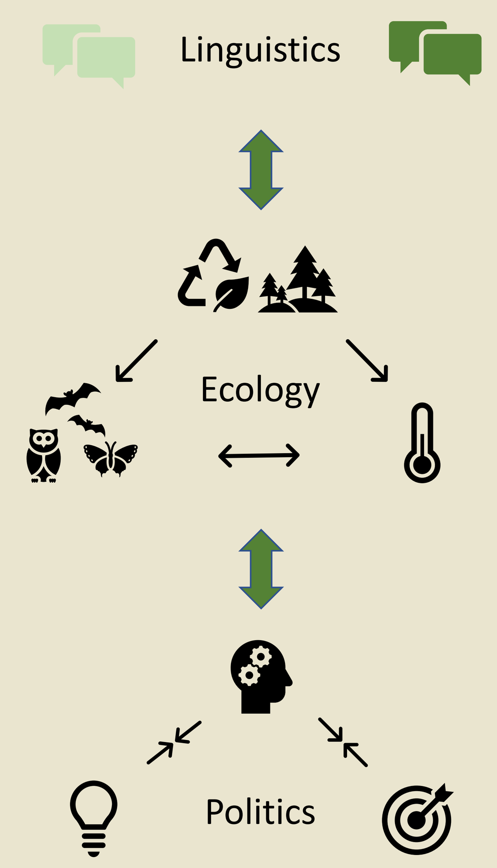
- Biodiversity loss & climate change
- High mitigation potential of forest ecosystems on climate change and biodiversity loss
- Increasing public & political interest in sustainable forest management
- Conflicting goals of different stakeholders

➡ Need for management approaches that increase potential synergies

Project aims

- Contribution to the understanding of sustainable forest management
- Implementation of possible synergies between carbon storage and biodiversity in daily action & political decisions
- Provision of action-oriented guidance on how forest management for climate change and biodiversity loss mitigation can be communicated

Project structure



Ecological subproject: Can biodiversity and climate change mitigation be achieved simultaneously? First results

Research questions

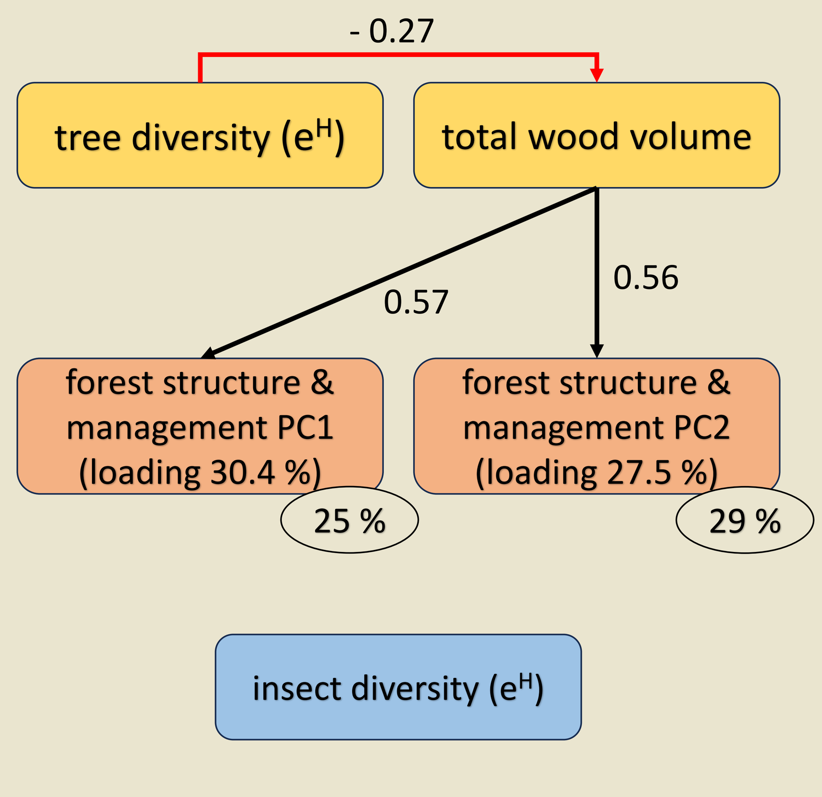
- Does total wood volume [surrogate for carbon stocks] influence insect diversity?
- Do different feeding guilds react differently to a higher amount of wood volume?

Methods

To disentangle the effect of wood volume on insects, we used data from forest inventories (2012-2014) of 139 plots in three regions of Germany (Biodiversity Exploratories). Beetles & true bugs were sampled in 2014 using window traps, identified and divided into feeding guilds. Tree and insect diversity (e^H) were calculated per plot. As a surrogate for carbon stocks, we used total wood volume (sum of deadwood and living wood volume). To account for indirect effects of total wood volume on insect diversity, a PCA was calculated on forest structure (effective number of layers, stand structural complexity, canopy openness & deadwood diversity) and management (prop. of non-native trees, prop. of harvested tree biomass, prop. of deadwood showing signs of saw cuts) parameters. All variables were analysed using structural equation modelling (piecewiseSEM in R) with region and forest type as random effects.

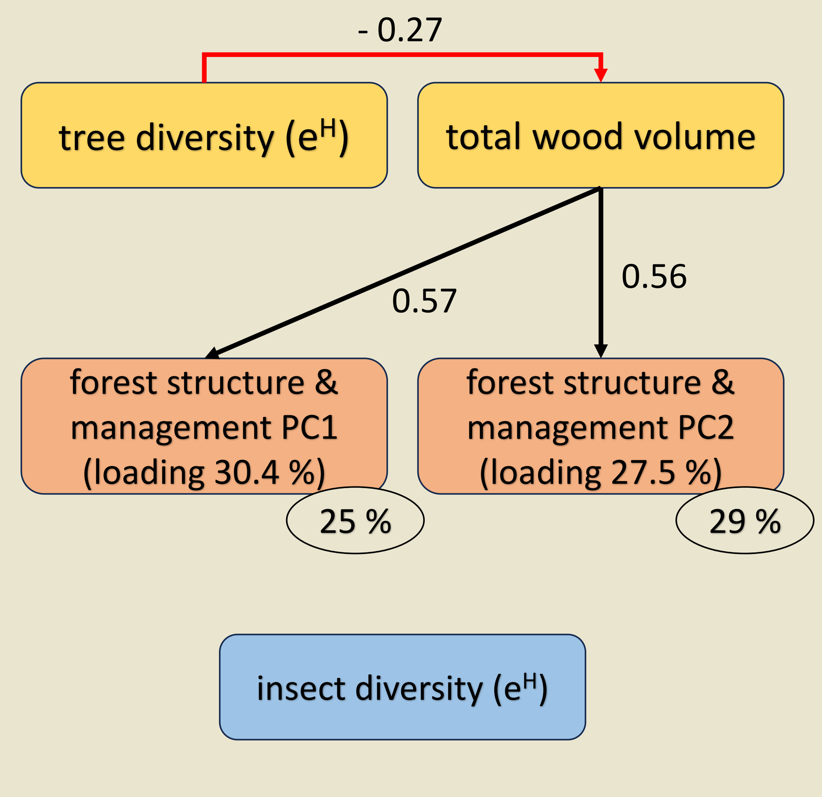
First results

omnivorous insects
(beetle species: 204, true bug species: 18)



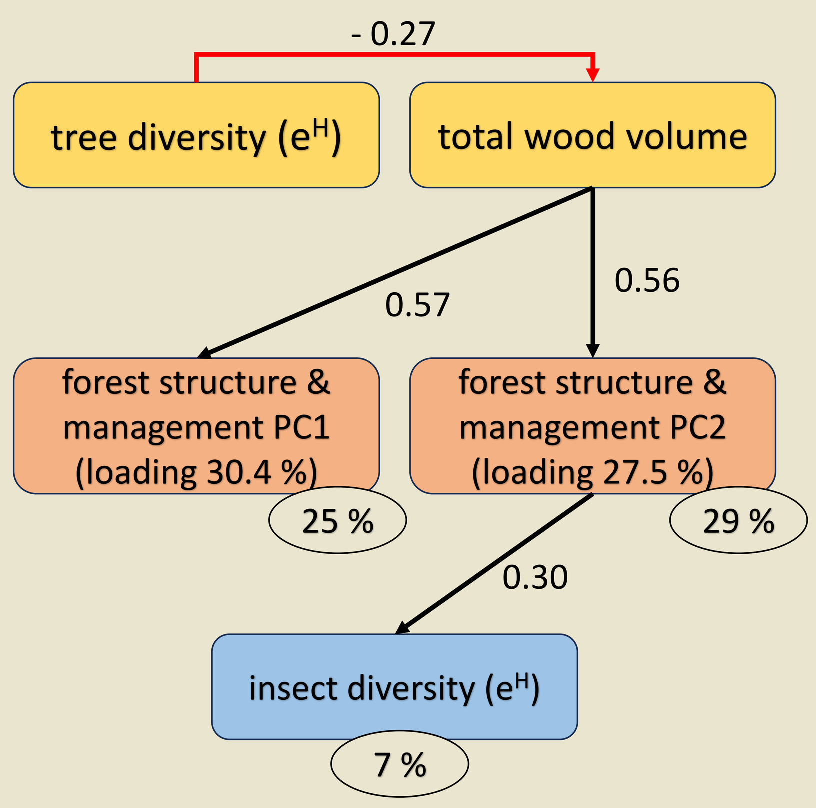
Fisher's C: 2.23, p = 0.328

carnivorous insects
(beetle species: 225, true bug species: 31)



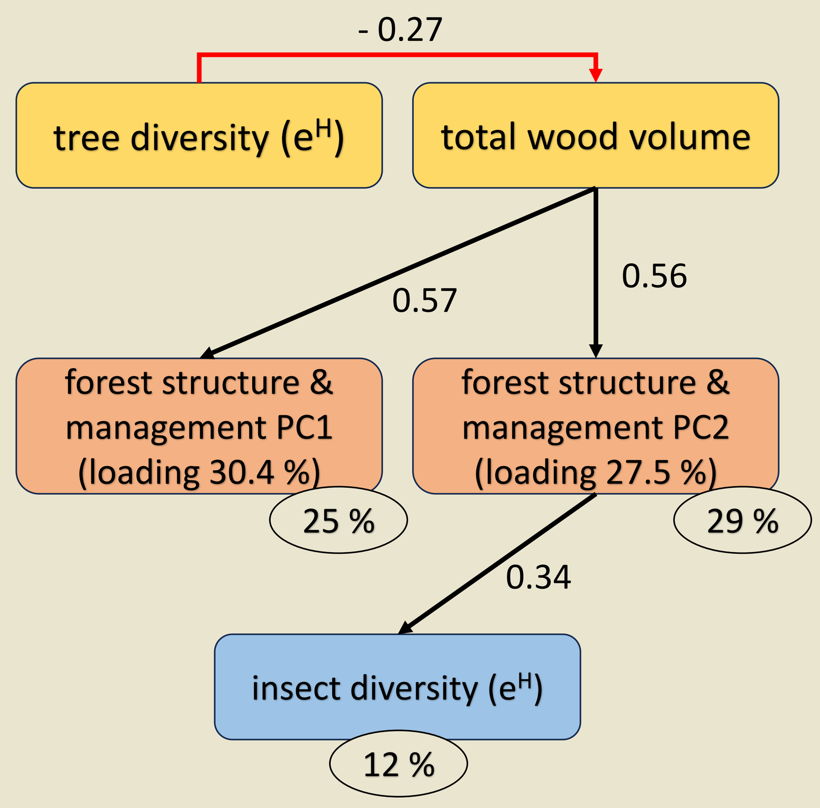
Fisher's C: 2.23, p = 0.328

myceto-detritivorous insects
(beetle species: 181, true bug species: 0)



Fisher's C: 2.23, p = 0.328

herbivorous insects
(beetle species: 159, true bug species: 61)



Fisher's C: 2,23, p = 0.328

Conclusion

- Total wood volume only has indirect effects on insect diversity. The feeding guilds are affected differently
- We found indirect effects through PC2. PC2 is mainly driven by stand structural complexity (29 %), prop. of harvested tree biomass (23 %), effective number of layers (15 %) and prop. of non-native tree species (13 %)
- Effective number of layers and the prop. of non-native trees positively affect insect diversity
- Stand structural complexity and the prop. of harvested tree biomass have negative effects on insect diversity
- Reaction of myceto-detritivorous and herbivorous insects to forest structure & management and therefore indirect to total wood volume
  - ➢ Vertically multi-layered forests lead to more resources (e.g. food, microhabitats,…)
  - ➢ More harvested biomass decrease the number of potential habitats and food resources

Further research

- Exchange of total wood volume with carbon stocks, including litter and topsoil carbon
- Analyses of other years with existing data to evaluate generality of results
- Integration of additional forest structural components to identify drivers of insect diversity

About the author

I am interested in the effects of land use changes on insect communities, with a special affection on beetles. In my research as a PhD student, I mainly focus on the impacts of forest management on insects.

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