



Ecosystem functioning in forests

How species and functional diversity drive the decomposition of woody debris

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Background:

The loss of biodiversity worldwide is threatening the provision of ecosystem services, such as the decomposition of organic matter and the cycling of nutrients and carbon. Dead wood is a major pool of organic matter in forested ecosystems and forms habitat for many species. Wood-inhabiting organisms, such as fungi and insects, contribute significantly to wood decomposition. However, it remains unclear how changes in biodiversity and the functional composition of species assemblages may affect decomposition rates of dead wood. Moreover, the role of different taxa is likely to vary geographically and relative to climate but overall patterns are unknown.

Objectives:

1. Untangle the role of biodiversity and functional diversity of dead-wood dependent beetles for wood decomposition
2. Untangle the effects of interactions between fungi and beetles on wood decomposition
3. Evaluate the relative contribution of insects and fungi to wood decomposition relative to climate on a global scale

Experiment 1:

Experimental exposure of 400 m³ of dead wood on 60 plots in the Bavarian Forest National Park covering gradients of microclimate, dead-wood amount and dead-wood diversity. Dead-wood dependent beetles and fungi were recorded for four years and will be linked to wood decomposition rates.

- How interact beetle and fungal communities (co-occurrence, vectoring, symbioses)?
- How do these interactions affect decomposition rates?



All photographs by Sebastian Seibold, besides where indicated differently.

Experiment 2:

Manipulation of beetle communities colonizing dead-wood logs enclosed in insect-proof cages to form gradients of species richness and functional diversity.

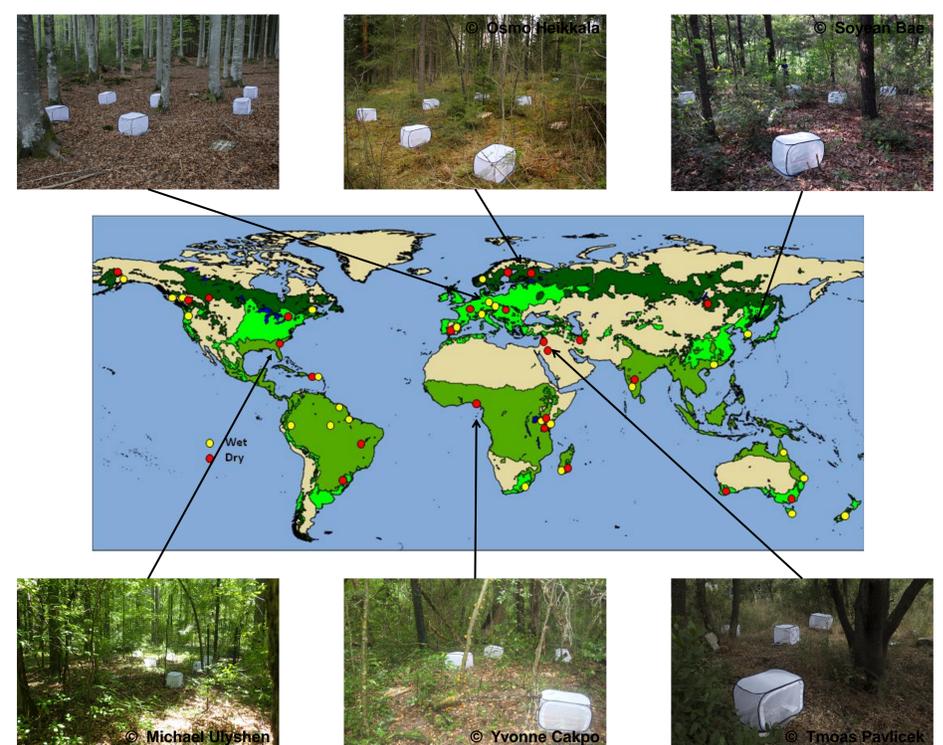
- Is the number of species or the functional composition more important for decomposition of wood?



Experiment 3:

Comparison of decomposition rates of dead-wood branches protected and unprotected from insects in a network of 50 replicated sites along worldwide gradients of temperature and precipitation.

- How changes the contribution of insects and microbes to wood decomposition relative to global climate?



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