Changes in species- and community-level properties of forest vegetation along cloud and chronic-wind gradients in Taiwan

About the project

Taiwan as a subtropical island exposed to East-Asian monsoon system offers a unique opportunity to study vegetation along two peculiar stress gradients, cloud frequency and chronic-wind intensity. Frequent cloud or persistent strong winds have remarkable ecological effects on vegetation and require specific species adaptations. Cloud and monsoon forests thus represent unique vegetation types, hosting a number of endemic and relict species. In the near future, ongoing climate change is expected to modify both cloud frequency and chronic-wind intensity. To understand the impact of these changes on future diversity and species composition of cloud and monsoon forests and the ecological mechanisms behind has therefore not only high theoretical values, but also practical importance in conservation.

In this project, we will use patterns of forest vegetation along the gradient of cloud frequency and chronic-wind intensity in Taiwan as a model system to study mechanisms how species from species pool assemble to a local community. Apart from taxonomical approach (species census), we will also focus on plant functional traits, since these allow more mechanical and general explanation of environmental filtering. Four aims will be conducted on our model system:

1. to analyse species- and community-level changes in leaf and wood functional trait properties along cloud and wind gradients,
2. to analyse the pattern of taxonomic and functional diversity,
3. to compile Ellenberg-like species indicator values along gradients of cloud frequency and chronic-wind intensity, and
4. to identify cloud and wind specialists and their functional trait properties.

Additionally, we will invest considerable energy to sample the environment factors together with long-term microclimate monitoring, since detail knowledge of actual soil and microclimatic conditions are the keys to understanding how vegetation response to them.

Studies focused on cloud and wind gradients are rather rare, especially from subtropical regions, and many ecological questions remain unresolved. We believe that our project, applying modern methods from the toolbox of vegetation ecologists, can answer at least some of them. Such findings, apart from the general importance for theoretical ecology, have also a good potential for application in

conservation, management and restoration of these habitats, which are threatened by land-use and climate changes.

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