

# Forest regeneration in transition: Determinants in human-altered floodplain forests under passive conservation

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## Background

Designation of the **floodplain forest** of the **middle Isar** as a **forest reserve** in 2020

→ Suspension of all forestry operations

→ **Passive conservation**

**?** Which spatio-temporal drivers determine regeneration success and what is the effect on diversity and resilience?

## Hypotheses

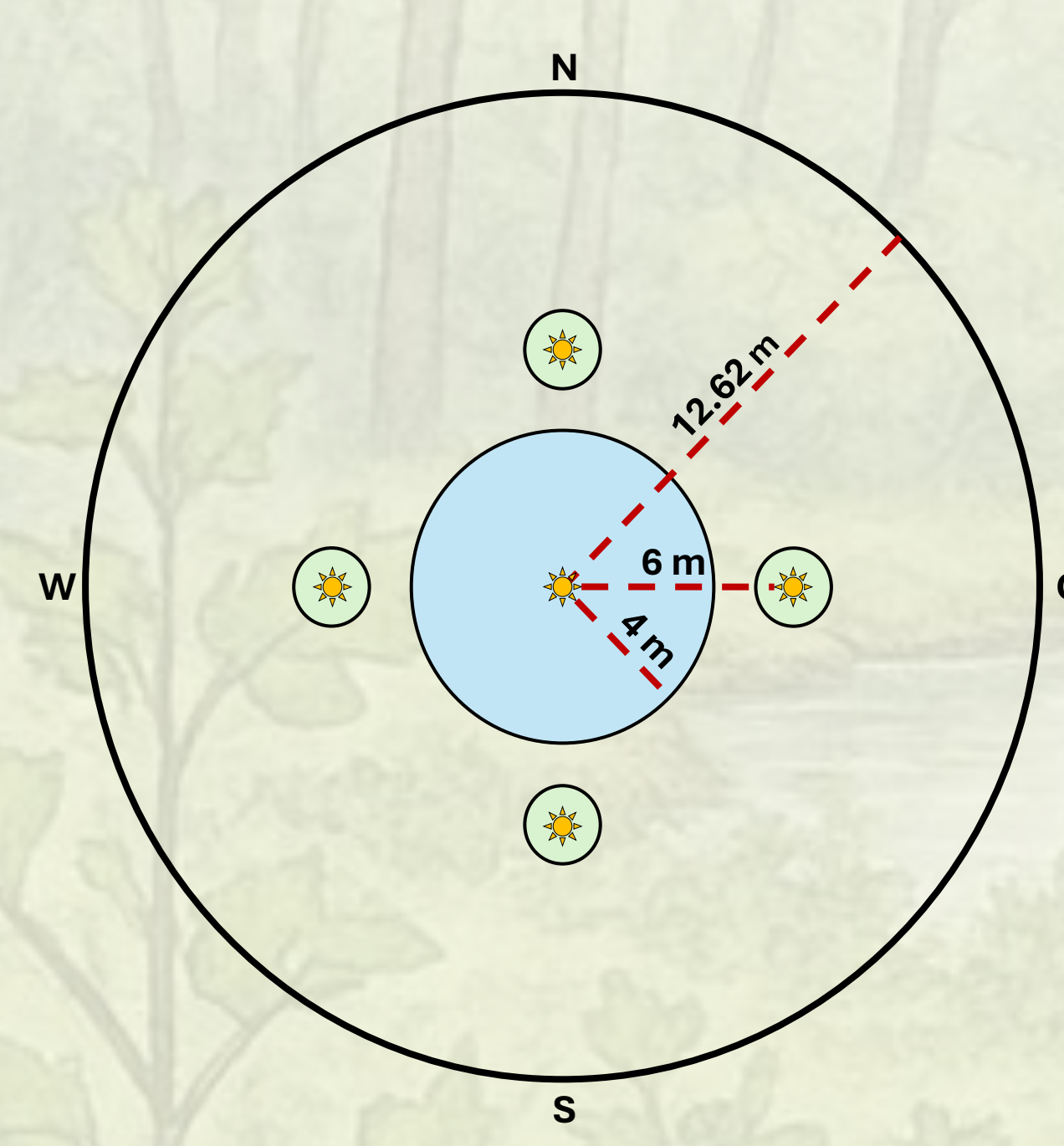
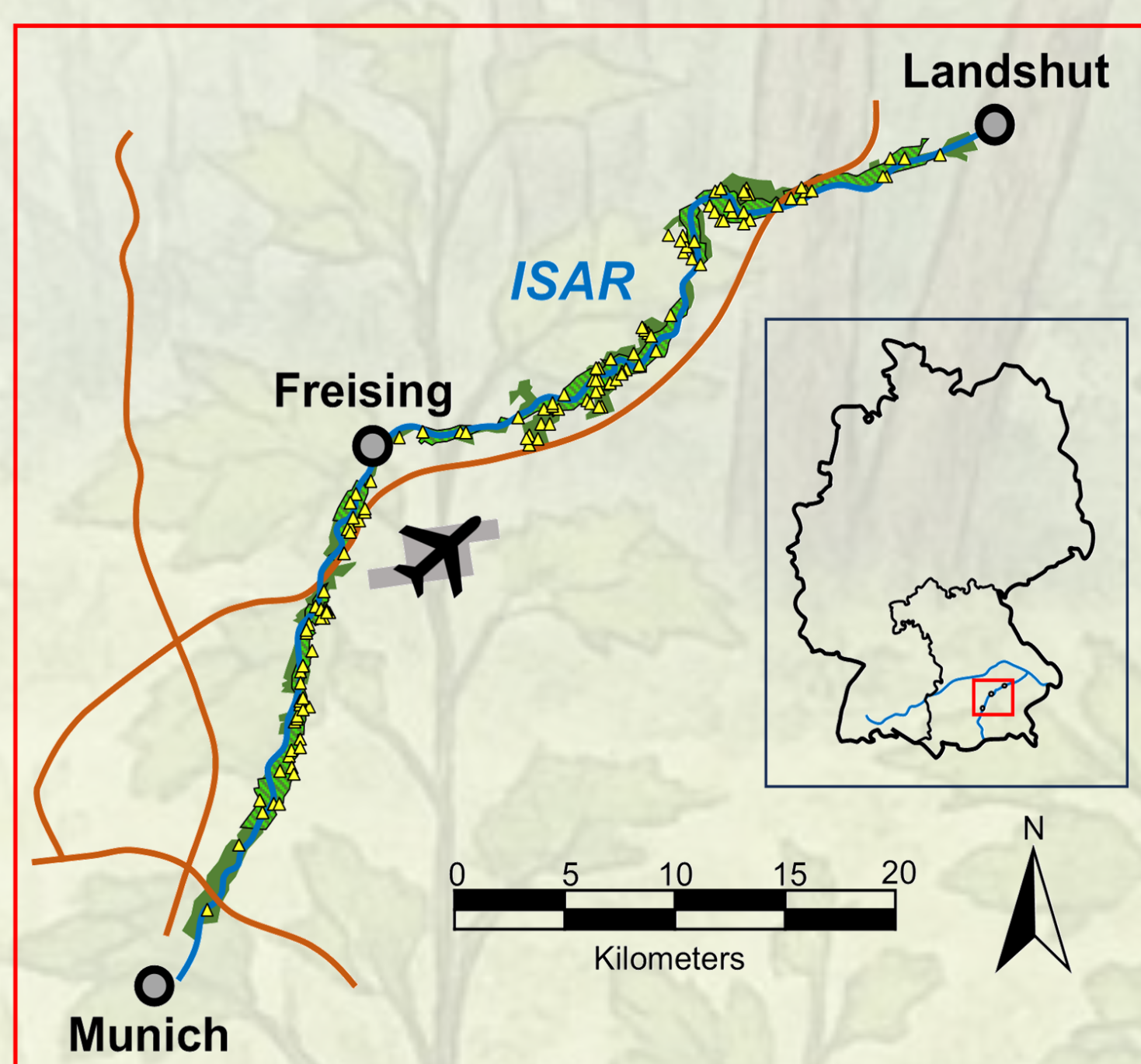
- Tree regeneration patterns differ between conspecific and heterospecific canopy compositions
- Abiotic site conditions (light) and biotic interactions (structural cover/competition, browsing) limit tree regeneration success
- Temporal changes in species-specific regeneration dynamics are reflected in compositional, and diversity shifts across structural layers and height classes

## Methods

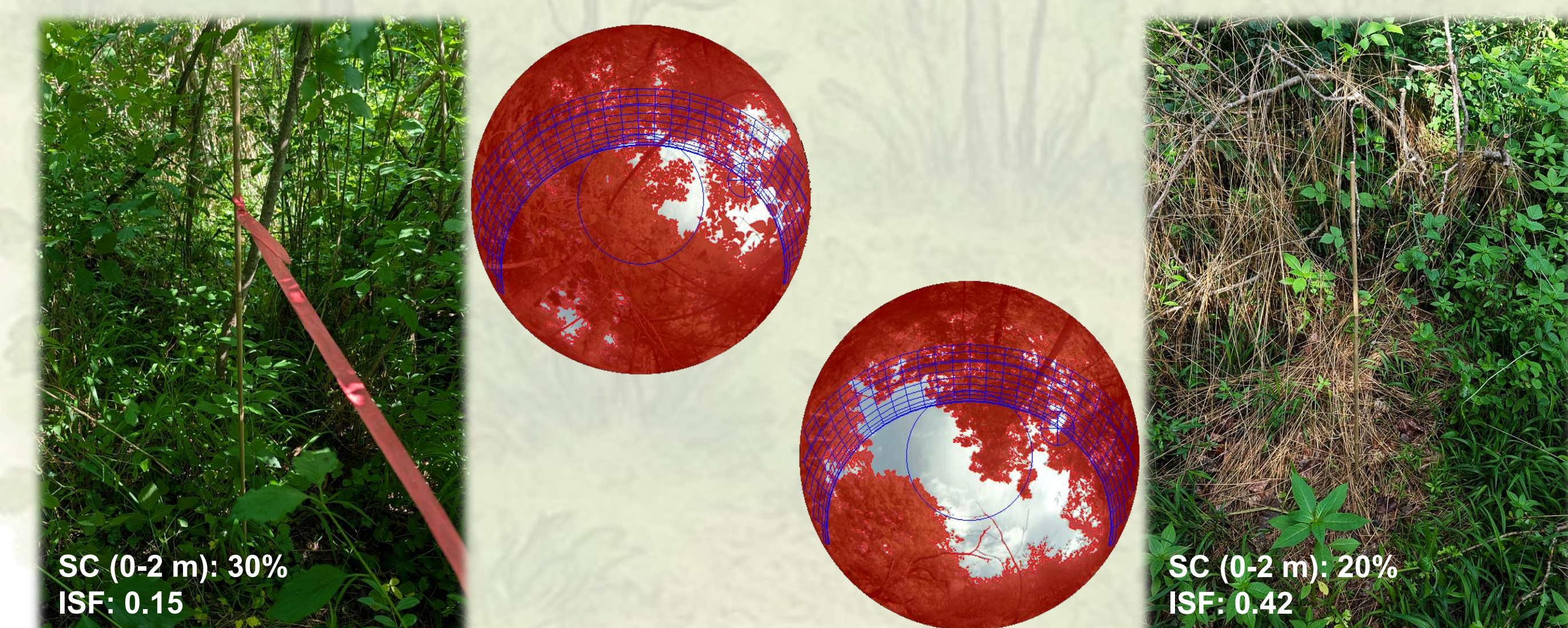
Regeneration assessment and measurement of light availability, structural cover and browsing on 122 pre-stratified plots of 500 m<sup>2</sup> of six different forest types (Maple + Lime, Ash, Alder + Willow, Poplar, Spruce, Pine) across the study area.

**Study area:**

**Plot design:**



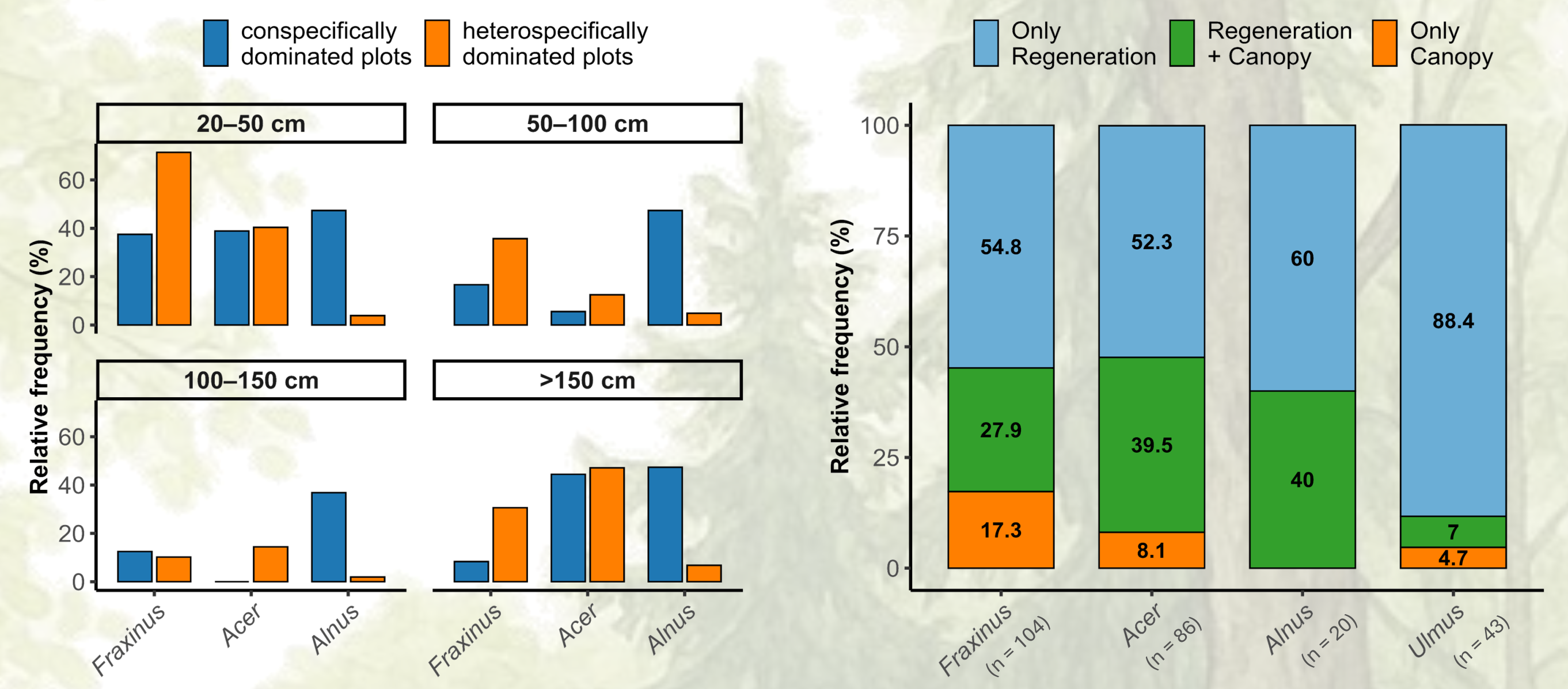
- Hemispherical light measurements with Solariscope SOL 300
- Regeneration assessment of non-established regeneration in three height classes between 20 and 150 cm & assessment of the structural cover (0-100%) and browsing damage on four subplots (r = 1 m) per plot.
- Regeneration assessment of established regeneration > 150 cm in height and < 12 cm in DBH on one centred subplot (r = 4 m) per plot.



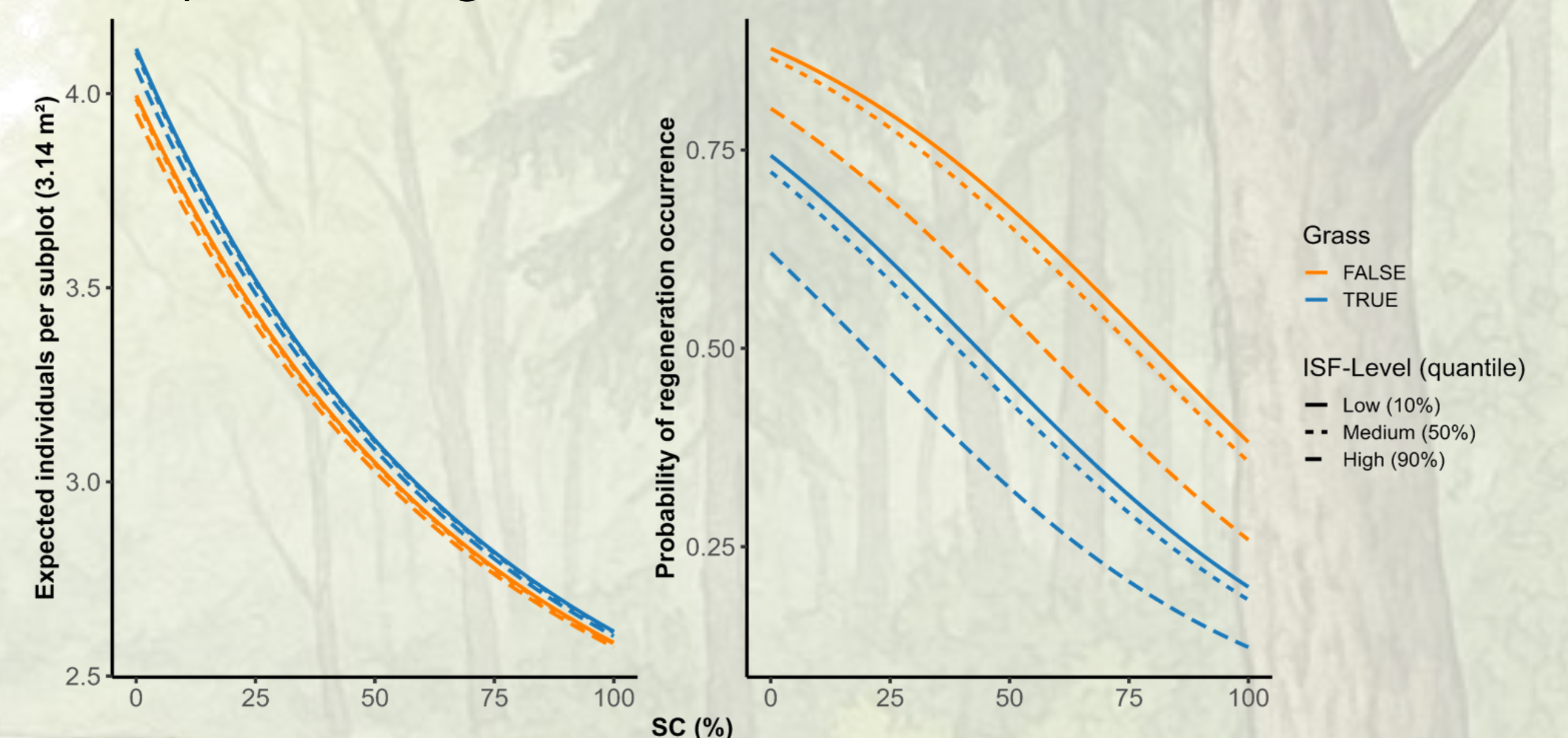
## Results

Out of **21 recorded tree species**, the **four most common genera** were analysed.

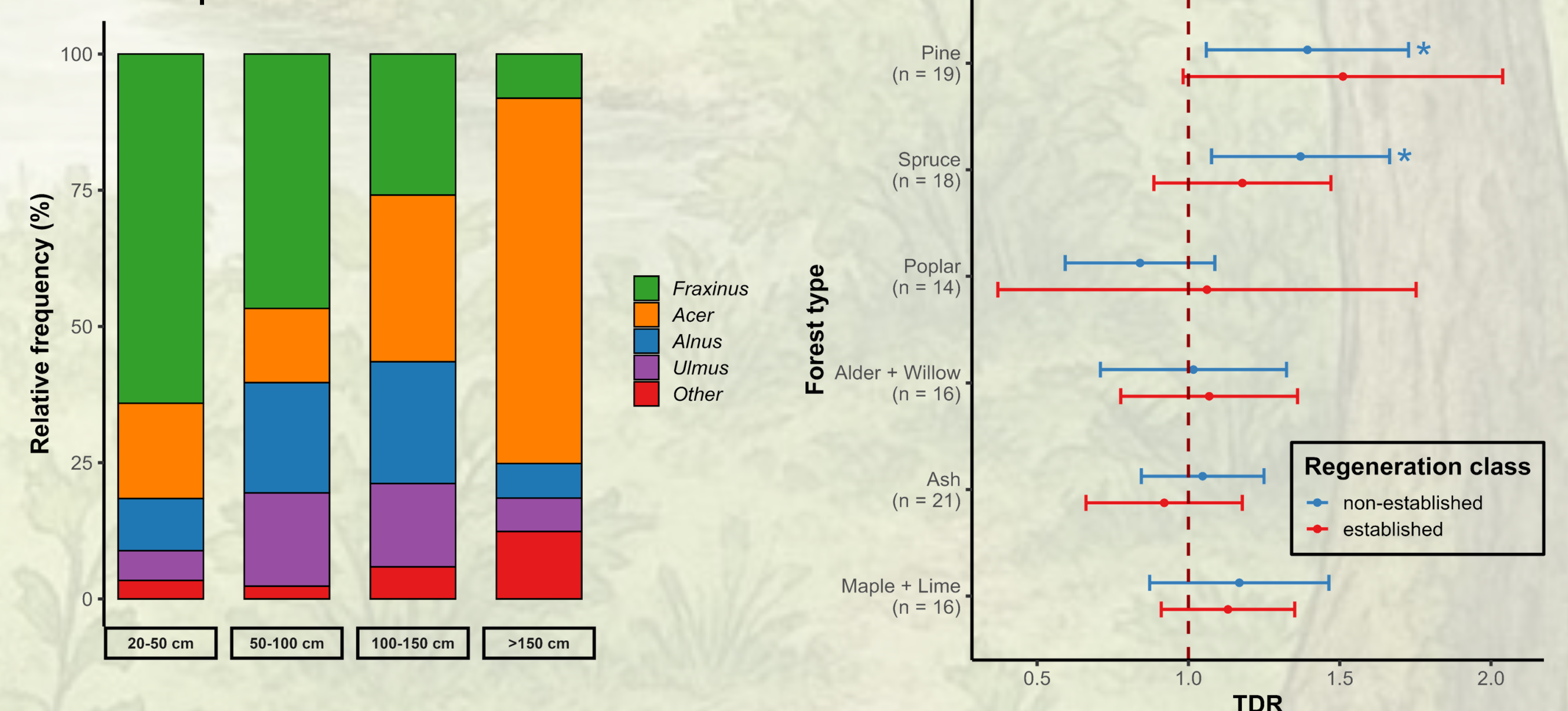
- Regeneration of *Fraxinus* preferred heterospecific canopies, *Acer* and *Ulmus* regenerated largely independent from the canopy layer and *Alnus* preferred a conspecific overstorey.



- Results of a hurdle model showed that light availability (ISF) had limited influence on seedling abundance, while regeneration probability and abundance declined significantly with increasing structural cover (SC) and the presence of grass.



- Compositional shift from *Fraxinus* dominance to *Acer* dominance over artificial timeline (height classes). The True Diversity Ratio (TDR) remained stable, only coniferous stands profited in terms of diversity from passive conservation.



## Conclusion

- Overstorey composition** shapes natural regeneration likely due to different **seed dispersal strategies**, species-specific **site requirements**, and host-specific **pathogen pressure**.
- Without regular **flooding events** competitive **herb and shrub vegetation** gains prevalence which reduces **regenerative success**.
- Passive conservation** alone may not be sufficient to restore a **resilient** and **diverse near-natural regeneration** in floodplain forests.