Vegetation composition along altitudinal and longitudinal gradients in Northwestern Patagonia

Federal Ministry of Food, Agriculture and Consumer Protection

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CIEFAP Conocimiento e Innovación en Bosques Patagónicos

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1. Aim of the study

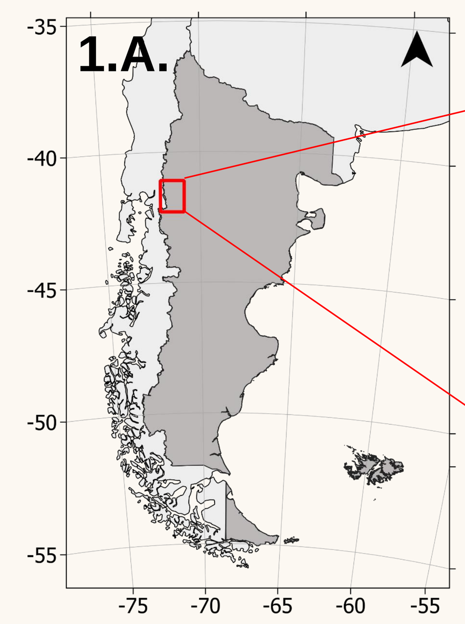
Characterize forest plant communities along altitudinal and longitudinal gradients in Argentinian Northwestern Patagonia (Fig. 1.A.)

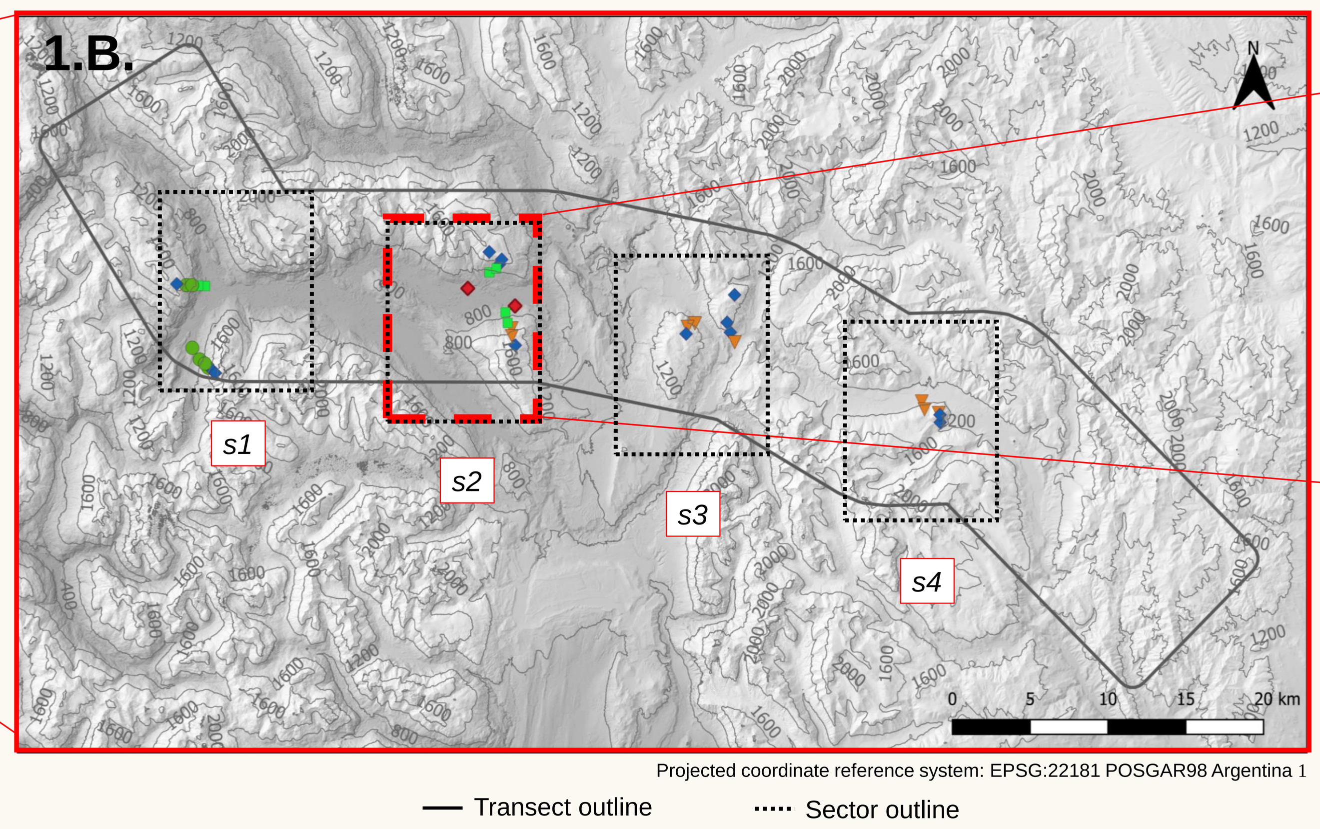
2. Longitudinal gradient

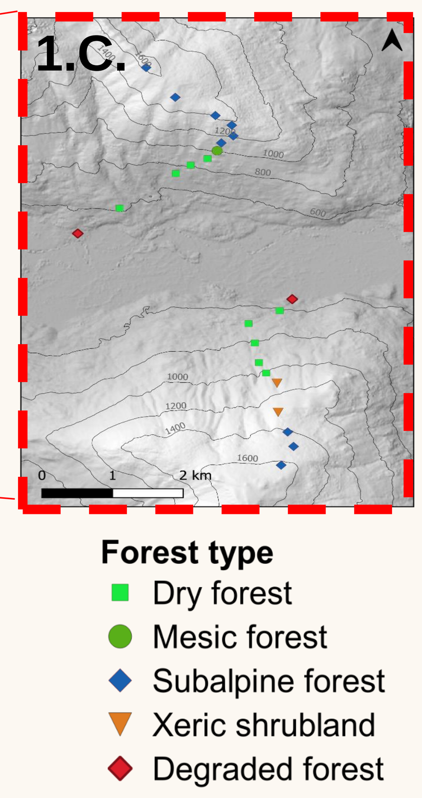
We selected a 70 km long transect along which rainfall and productivity steeply decrease from the West end in the Chilean Andes (Sector 1; 71.8°W) to the Eastern steppe boundary (Sector 4; 71.2° W). We selected four sectors along the transect located 15 km apart from each other (Fig. 1.B.).

3. Altitudinal belt

We surveyed tree and understory species turnover in a 100 m altitudinal interval of a belt ranging from 500 to 1600 m.a.s.l. We additionally considered both northern and southern exposure to represent contrasting mesoclimatic aspects (Fig. 1.C).

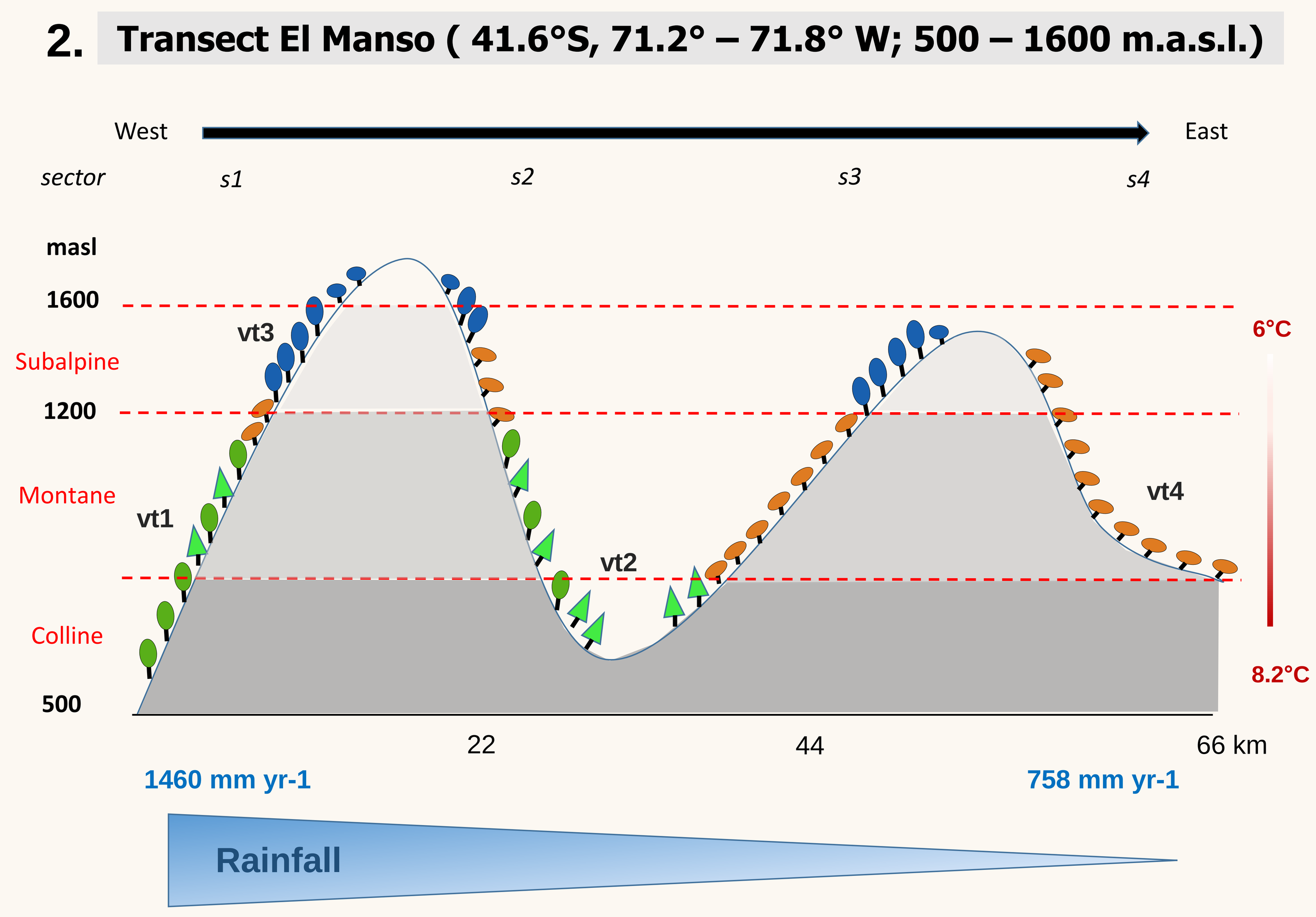






vt1 *Austrocedrus chilensis* and *Nothofagus dombeyi*

Vt12 *Gavileo-Austrocedretum chilensis*



vt3 *Nothofagus pumilio* subalpine deciduous forest

vt4 *Nothofagus antarctica* xeric post-fire shrubland

4. Vegetation types

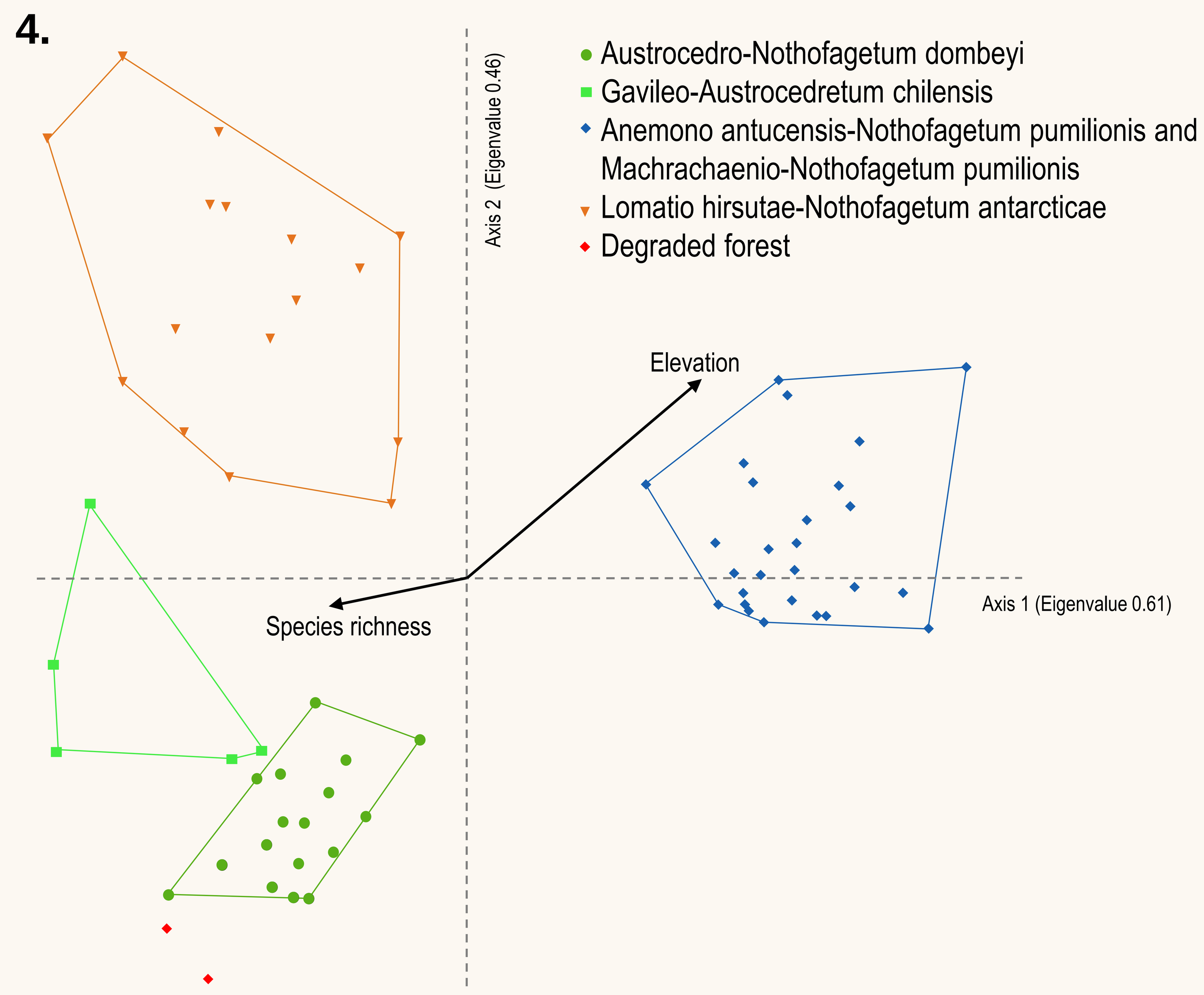
Nothofagus species do not overlap in their distribution and determine floristic dissimilarities in four main vegetation types (vt; Fig. 4): **vt1** *Austrocedro-Nothofagetum dombeyi* (Mesic mixed fores; Fig. 3.A) Eskuche 1968; **vt2** *Gavileo-Austrocedretum chilensis* (Dry forest; Fig. 3.B.) Eskuche 1968; **vt3** *Anemono antucensis-* Oberd. 1960/ and *Machrachaenio-Nothofagetum pumilionis* (Subalpine deciduous forest ; Fig. 3.C.) Eskuche 1973; **vt4** *Lomatio hirsutae-Nothofagetum antarcticae* (Xeric shrublands as initial stage of postfire succession; Fig. 3.D.) Eskuche 1969.

The length of gradients axis 1: **3.84 SD**, axis 2: **4.11 SD** indicate a **full species turnover** along the main gradient (Fig. 4.)

Mean forest structure parameters in the identified vegetation types

Vegetation types	n	N/ha	BA m²/ha	QMD cm	Vol m³/ha	AGB t/ha
Subalpine forests	11	922	50	38.0	468	201
Xeric shrublands	6	625	9	6.2	42	30
Dry forests	2	825	19	17.1	216	91
Mesic mixed forests	9	835	41	27.0	484	223
Degraded forests	2	393	25	27.5	144	71

n: number of plots; **N/ha:**trees/ha; **BA:** basal area; **QMD:** quadrat mean diameter; **Vol:** total volume; **AGB:** aboveground tree biomass



The DCA diagram shows **68 plots** recorded in 2021 ordinated on square-root transformed percent cover values of a total of **236 species**. Forest plant communities were classified based on floristic similarities and reference communities found in literature. Rare species (recorded only once) were downweighted (Fig. 4.).

5. Environmental drivers

- ✓ Elevation (in m.a.s.l.) significantly explains vegetation composition (r^2=0.478) as an indirect variable for covarying temperature and precipitation (Fig. 4.).
- ✓ Species richness increases towards drier and warmer lowlands (r^2=0.279) (Fig. 4.).
- ✓ Varying occurrence of fire driven by climate and topography along the gradient play a major role in determining vegetation assemblage.

6. Future work

With upcoming microclimatic measurements, soil analyses, and comparisons with historic vegetation data we aim to identify the main environmental drivers of vegetation shifts. Results can help to develop sustainable forest management concepts.

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References
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