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Alvaro Duque

RESEARCH ARTICLE

Large-Scale Patterns of Turnover and Basal Area Change in Andean Forests

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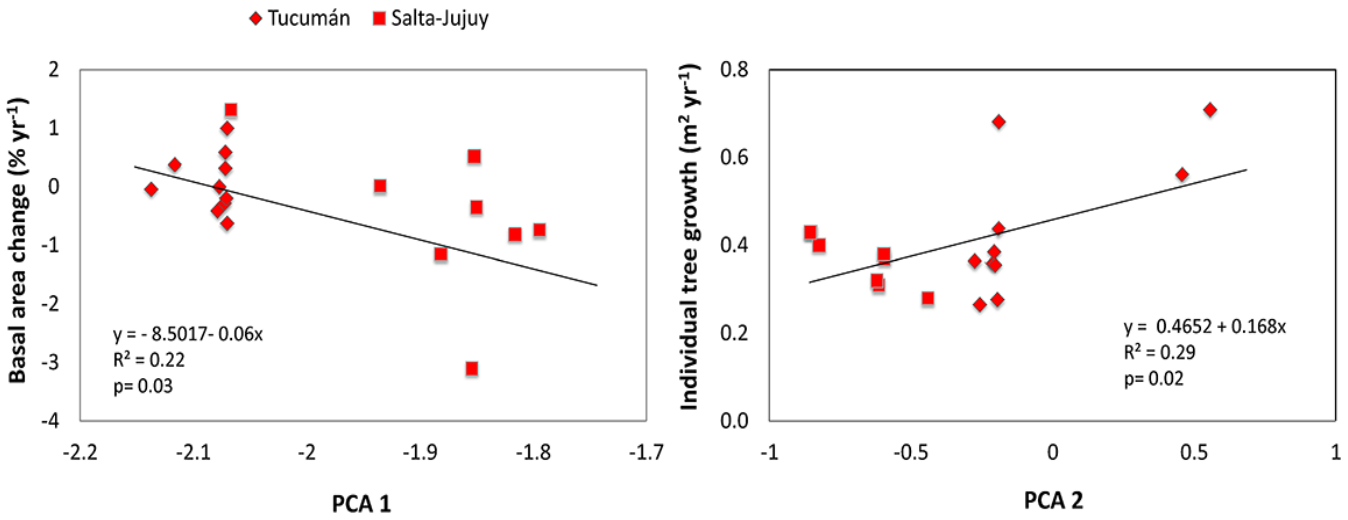

Fig 4. Linear regressions of forest demographic variables in North-Western Argentina. Basal area net change and individual tree growth and as a function of the first two factors of a Principal Component Analysis.

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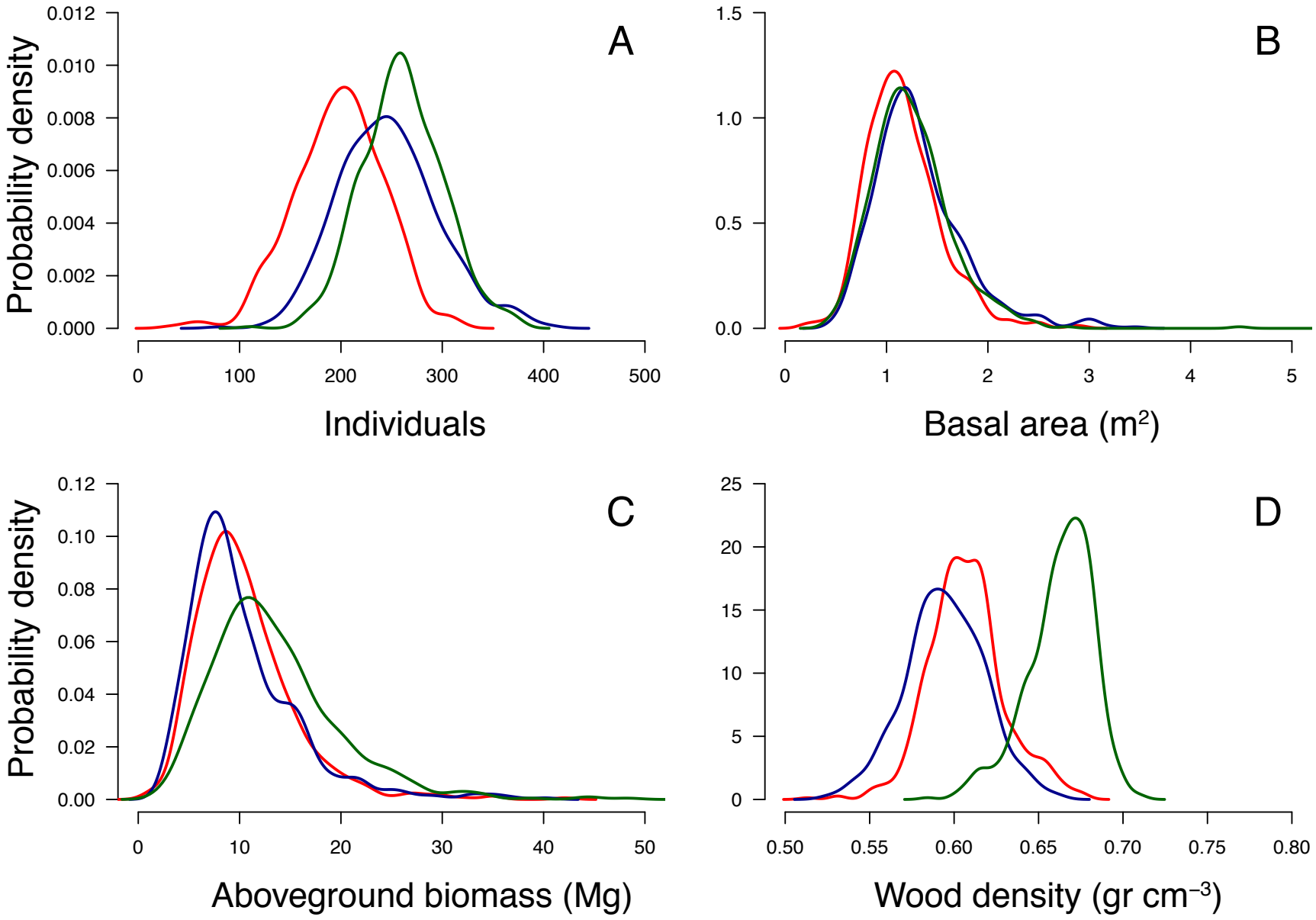
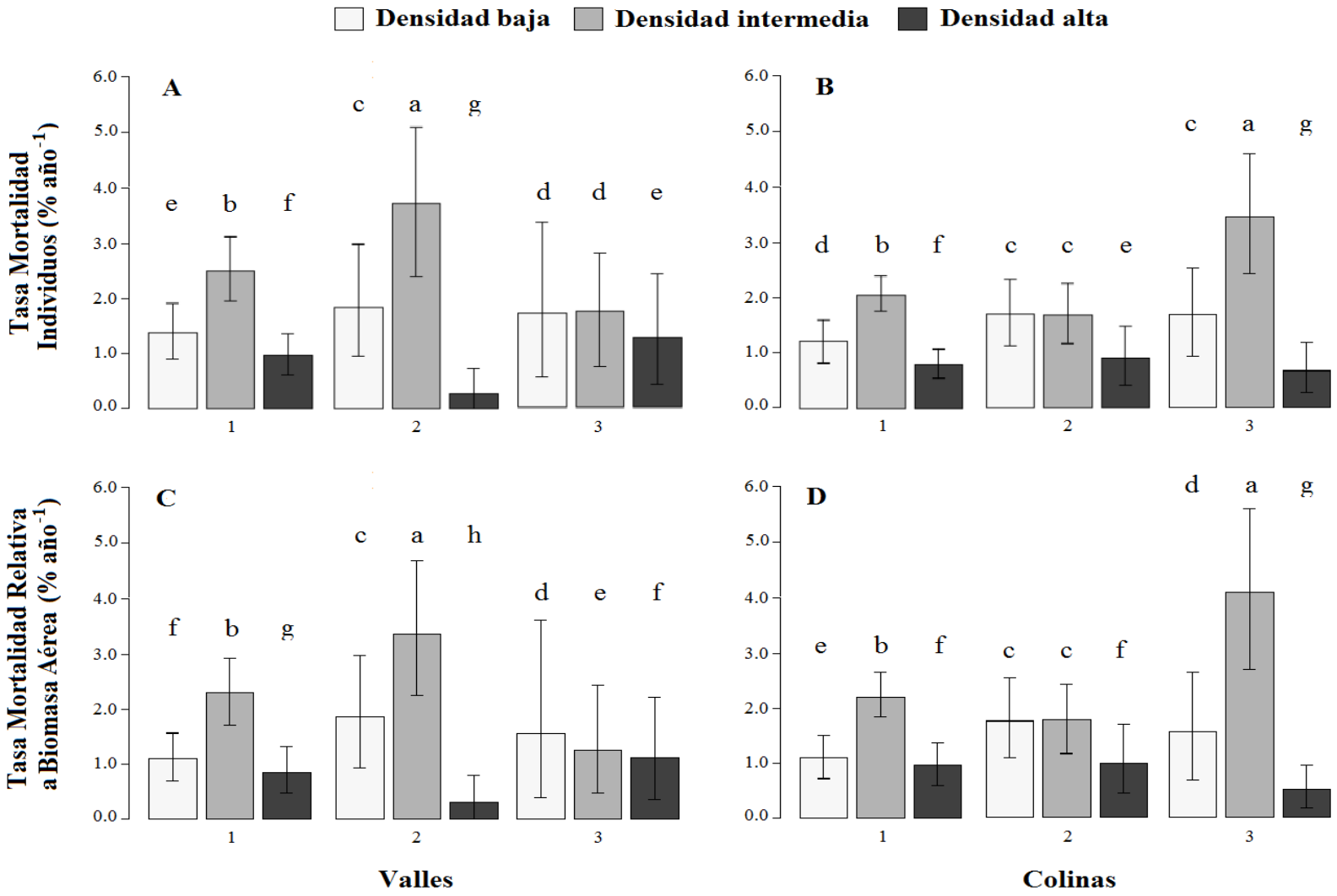

A
B
C
D
Probability density
Individuals
Basal area (m²)
Aboveground biomass (Mg)
Wood density (gr cm⁻³)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
100
200
300
400
500
1.5
1.0
0.5
0.0
1
2
3
4
5
0.12
0.10
0.08
0.06
0.04
0.02
0.00
10
20
30
40
50
25
20
15
10
5
0.50
0.55
0.60
0.65
0.70
0.75
0.80

Next Generation Ecosystem Experiment (NGEE)

- Workshop details:

- This workshop is hosted by DOE's Next Generation Ecosystem Experiment (NGEE)-Tropics project. This will be a three-day workshop with ca. 15-20 participants representing disciplines ranging from physiology, community ecology, and modeling.
- Day (1) will consist primarily of short presentations from experts on what approaches they have used and what synthetic results and knowledge they have gained using their particular approaches, and what developments (both model and empirical) they require.
- Day (2) will focus on outlining a critical series of analyses and papers to be executed through the course of Phase (1) of the NGEE-Tropics project, and how model algorithms will be developed. We will additionally identify a potential manuscript to arise specifically from the workshop.
- Day (3; ½ day) will be focused on finalizing the plan going forward and potentially drafting and outlining a schedule for completion of a manuscript. The second ½ day of day (3) will include a field trip to see a drought and heat manipulation at Los Alamos National Lab and potentially other local sites representing extreme drought-induced mortality.

Mortalidad por tamaños y calses de densidad de madera



General model

- AGB_change=(Competition+disturbance)+clima

The same model for each one of the demographic parameters

AGB_mort – AGB_recr – AGB_growth

How to represent each explanatory set of variables?

- Competition:
  - Stand Density Index (SDI): $\log_{10}N = -1.605(\log_{10}D) + k$
  - Gini coefficient:

$$G = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} h_i - h_j}{2\bar{h}n(n-1)}.$$

line. The Gini coefficient ranges between 0 and 1; when this setting tends to zero the resource is evenly distributed. On contrary, when the Gini coefficient tends to one, it means that a very small portion of the population is uptaking almost all of the resource. For calculation purposes, individuals were

Curvas de Laurenz

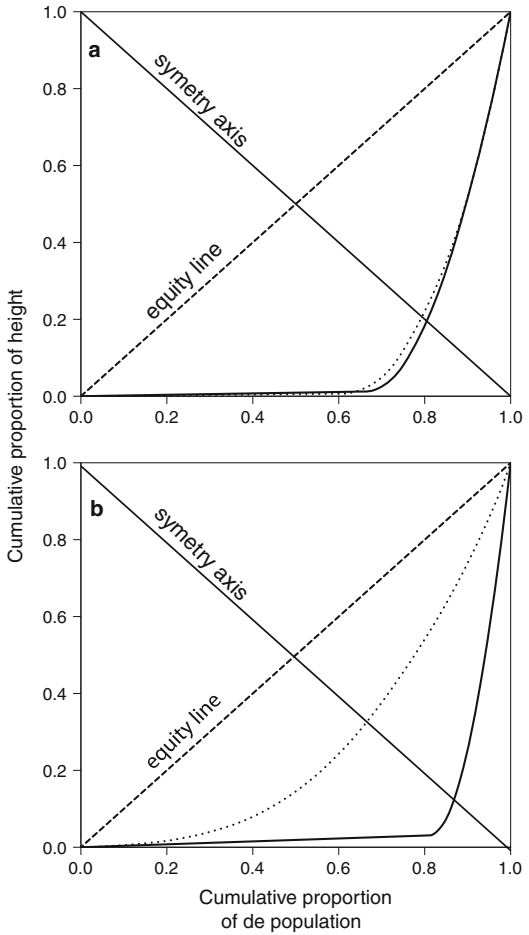


Fig. 1 Lorenz curves of *E. oleracea*: **a** forest without intervention and **b** thinned forests. The *continuous lines* represent the *E. oleracea* size–abundance trend in 1997. The *dotted lines* represent the *E. oleracea* size–abundance trend in 2008. The *dashed line* crossing the plot from one extreme to another represents the expected 1:1 relationship of equal resource uptake by all individuals

Ramirez et al 2015

Disturbance:

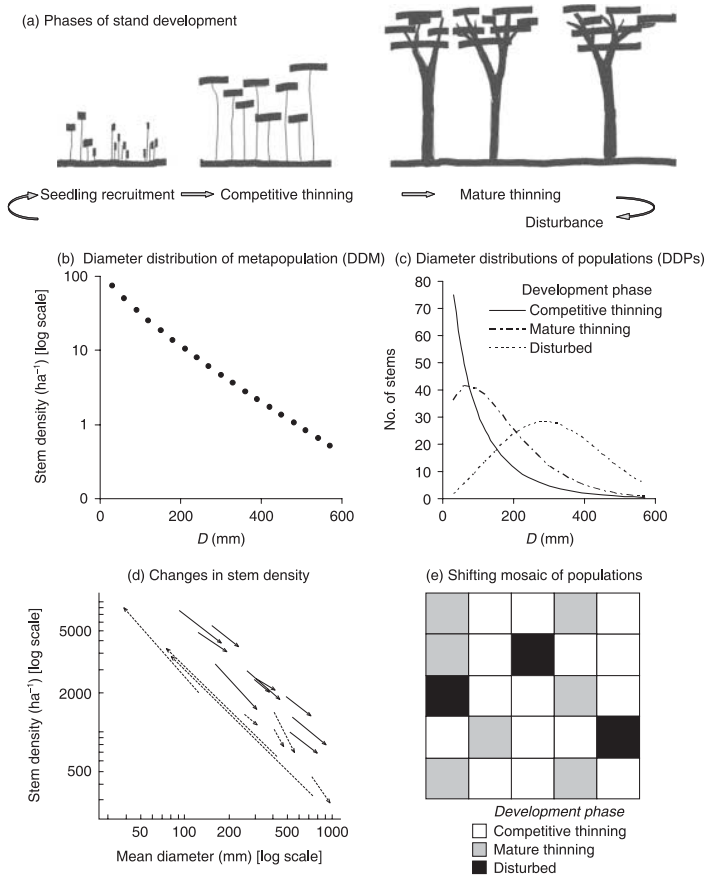


Fig. 1 (a) Factors influencing the diameter distribution of trees in natural mixed-aged forests can be discerned by recognizing forests as consisting of a shifting mosaic of patches at different developmental stages (seedling recruitment, competitive thinning, mature thinning and disturbed). Using this approach, the diameter distribution of the metapopulation (DDM), as shown in (b), is seen to be influenced by three aspects of population size structure: (c) the way in which the diameter distribution of populations (DDPs) varies as they age; (d) the way in which stem density decreases over time in thinning stands as a result of competition for space (solid arrows), and increases over time in disturbed stands as a result of seedlings recruit (dashed arrows); and (e) the age distribution of populations, which is controlled by disturbance.

Coomes & Allen 2007

Probability of death in relation to initial size

$$p_r(m) = \frac{\exp(\alpha + \beta \times h)}{1 + \exp(\alpha + \beta \times h)}$$

The value of the Beta parameter can be interpreted in terms of disturbance

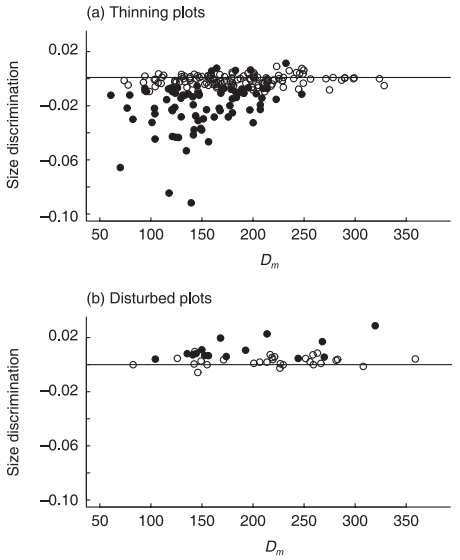


Fig. 2 Size-discrimination of mortality processes within (a) thinning, and (b) disturbed *Nothofagus* stands, in relation to the mean stem diameter of the stands (D_m). The extent of size-discrimination was estimated by modelling death as a function of stem diameter by fitting the function logit(P) = $a + bD$ using logistic regression, where P is the probability of death, D is stem diameter, and b is the parameter which indicates the degree of size discrimination (● = significant and ○ = not significant at $P = 0.05$). When $b < 0$, smaller trees within stands are most likely to die, and when $b > 0$ the larger trees are more likely to die.

Climate:

- Exogenous variables:
  - Wordclim: minimum temperature, variance, seasonality, etc.
  - ENSO index
  - DATA FIRST CENSUS AND VARIANCE ALL YEARS COVERED BETWEEN CENSUS?
- Endogenous variables: (Feeley et al 2011)
  - Thermal Migration Rates (TMRs)
  - Community Temperature Scores (CTS)
  - Other???