

# Forest degradation modifies litter production, stoichiometry, and decomposition dynamics in Southern Temperate Forests.

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## Abstract

Anthropic disturbances are driving unprecedented changes in forest ecosystem functions and biogeochemical processes, hindering the forests' benefits to society. Litter decomposition is one of the most critical processes that regulates the carbon and nutrient cycling. However, it is unclear how degradation affects litter decomposition and carbon and nutrient dynamics. The main objective of this study was to evaluate the effect of forest degradation on the production and decomposition of litter and C:N:P stoichiometry dynamics in a temperate forest in south-central Chile. Litter traps and litter bags were installed in three Long Term Research Forest Plots (LTER) representing different conservation states: mature, secondary, and degraded *Nothofagus* forests. The litter production, decomposition, and C, N, and P concentrations were evaluated monthly for one year. The total litter input varied between 3.5 to 1.1 Mg ha<sup>-1</sup> year<sup>-1</sup> in the mature and degraded forests, respectively. We found the highest lignin and nutrient levels in the degraded forest and the lowest in the mature forest. The remanent litter mass reached 56% in the mature forest, while it was only 93% in the degraded forest. Decomposing litter showed the lowest C:N and C:P ratios in the mature forest during most of the year. The balance between inputs and outputs yielded a greater accumulation of litter in the mature forests. Our results strongly suggest that anthropic degradation has altered litter quality, production, decomposition, and nutrient dynamics. Further research should be focused on assessing how changes in litter dynamics affect natural forest regeneration and soil biogeochemical functioning.

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