



University of Kentucky
UKnowledge

International Grassland Congress Proceedings

21st International Grassland Congress / 8th
International Rangeland Congress

Biodiversity and Structure of Subtropical Boliviano-Tucumano Mountain Forests, Depending on Disturbance Intensity due to Forest Grazing and Selective Timber Logging

Andrea C. Mayer
ETH Zurich, Switzerland

F. S. Zenteno
Herbario Nacional de Bolivia, Bolivia

S. Beck
Herbario Nacional de Bolivia, Bolivia

Svenja Marquardt
ETH Zurich, Switzerland

Michael Kreuzer
ETH Zurich, Switzerland

See next page for additional authors

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/21/1-3/6>

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

Presenter Information

Andrea C. Mayer, F. S. Zenteno, S. Beck, Svenja Marquardt, Michael Kreuzer, and H. Alzérreca

Biodiversity and structure of subtropical Boliviano-Tucumano mountain forests , depending on disturbance intensity due to forest grazing and selective timber logging

A .C .Mayer¹ , F .S .Zenteno² , S .Beck² , S .Marquardt¹ , M .Kreuzer¹ and H .Alzérreca²

¹ETH Zurich , Institute of Animal Science , Switzerland ; ²Herbario Nacional de Bolivia , La Paz , Bolivia , E-mail : andrea.mayer@inw.agrl.ethz.ch

Key words : agroforestry , Bolivia , plant species diversity , silvopastoral systems

Introduction The *Parque Natural de Flora y Fauna Tariquía* , Department of Tarija , Bolivia is dominated by the *Boliviano-Tucumano subandean semideciduous and seasonal evergreen vegetation* (Navarro , 2004) . These forests have been used as dry season grazing area of Criollo cattle for centuries . In the last decades , easier accessible parts of the reserve were additionally affected by selective timber logging . The influence of forest grazing and selective timber logging on the plant species composition of the Boliviano-Tucumano mountain forests has not been studied before . This study investigated plant species diversity and forest structure in areas with different disturbance regime . The results can serve as a basis for decisions regarding the future management of the reserve .

Material and methods In three valleys of the mountainous nature reserve *Parque Natural de Flora y Fauna Tariquía* , with an altitudinal gradient of 990 to 1270 m a.s.l. , 25 Gentry-type temporary plots each of 0.1 ha (50m×20m) were installed , and divided in 10 sub-plots of 10m×10 m . Plant species , height , diameter , infestation with lianas , and the phenological state of all woody plant species and lianas with ≥ 2.5 cm diameter (D.B.H.) were determined . Based on abundance , dominance and frequency , the Index of Importance Value (IIV) according to Mueller-Dombois and Ellenberg (1974) was calculated and used for Detrended Correspondence Analysis (DCA) to group the plots (Kent and Coker , 1992) and Canonical Correspondence Analysis (CCA) was used to determine the importance of the intervening variables .

Results Within the 49 families registered , the most frequently found families were Myrtaceae (17.1%) , Solanaceae (9%) , Sapindaceae (7.8%) , Euphorbiaceae (5.6%) , Bignoniaceae (5.5%) , Melastomataceae (5.4%) , Apocynaceae (4.8%) , Rubiaceae (4.2%) , Meliaceae (4.1%) , Asteraceae (4%) , Lauraceae (3.3%) and Fabaceae-Mimosoidae (3.2%) . The most frequently found plant species were *Myrciaria delicatula* (10.5%) , *Miconia calvescens* (5.3%) , *Fosteronia glabrescens* (4.8%) , *Sebastiania fiebrigii* (4.5) , *Solanum symmetricum* (4.3%) , *Psychotria carthagenensis* (3.6%) , *Trichilia clausenii* (3.5%) , *Vernonia pinguis* (3.4%) and *Blepharocalyx salicifolius* (3%) . In total , 123 woody plant species and lianas were found . The Detrended Correspondence Analysis (DCA) of the plant species composition showed that the plots can be classified into five groups , according to the intensity of grazing and timber logging : In the less disturbed Group 1 , the species with the highest Index of Importance Value (IVV) were *Trichilia clausenii* (8.1%) , *Piper amalago* (5.5%) , *Nectandra cf. angusta* (4.1%) and *Psychotria carthagenensis* (4%) . Group 2 : *Miconia calvescens* (27.1%) , *Solanum symmetricum* (8.9%) , *Phoebe cf. porphyria* (7.8%) , *Piper amalago* (5.7%) and *Amphilophium pannosum* (5.1%) . Group 3 : *Myrciaria delicatula* (15.5%) , *Prunus sp.* (11.7%) , *Ilex argentina* (11.4%) , *Terminalia triflora* (5.8%) and *Blepharocalyx salicifolius* (5.4%) . Group 4 : *Myrciaria delicatula* (15.5%) , *Prunus sp.* (11.7%) , *Ilex argentina* (11.4%) , *Terminalia triflora* (5.8%) and *Blepharocalyx salicifolius* (5.4%) . In the most disturbed Group 5 , the species with the highest IVV were *Solanum aff. symmetricum* (16.9%) , *Acacia aroma* (13.31%) , *Vernonia pinguis* (13.84%) , *Sapium haematospermum* (8.5%) and *Celtis spinosa* (5.3%) . The groups 1 to 5 also differed in forest structure . Group 1 had the highest variability of diameter and height class . This variability decreased with increasing disturbance intensity , and also the mean base area decreased . The latter was 8.9 m²/ha and 2 m²/ha in group 1 and 5 , respectively . At the same time , the number of plant individuals increased with increasing disturbance intensity . Areas with medium disturbance intensity had the highest cover percentage of lianas (almost 30%) . In the Correspondence Analysis (CCA) , the disturbance intensity (including both grazing and timber extraction) had a significant ($p < 0.005$) influence on the botanical composition of the different forest sites .

Conclusions The disturbance intensity had a significant influence on the botanical composition of the Boliviano-Tucumano forests . Furthermore , the number of plant individuals increased and both the mean base area and the variability of diameter and height classes decreased with increasing disturbance intensity . Further studies including controlled experiments and direct observations , are necessary to evaluate the influence of different intensities of cattle grazing on plant species composition and forest structure , and thus differentiate between the effects of timber extraction and forest grazing .

Reference

- Kent , M . , Coker , P . (1992) . *Vegetation Description and Analysis : a Practical Approach* . J . Wiley & Sons , New York .
 Navarro , G . (2004) . Provincia Biogeográfica Boliviano-Tucumana . Chapter 8 . , pp 351-451 . In : Navarro , G . , Maldonado , M . *Geografía Ecológica de Bolivia : Vegetación y Ambientes Acuáticos* . 2nd edition . Editorial : Centro de Ecología Simón I . Patiño-Departamento de Difusión . Talleres de Industrias Graficas SIRENA . Santa Cruz de la Sierra , Bolivia . , pp 719 .