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SHORT COMMUNICATION

Selecting Species for Passive and Active Riparian Restoration in Southern Mexico

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Abstract

In revegetation projects, distinguishing species that can be passively restored by natural regeneration from those requiring active restoration is not a trivial decision. We quantified tree species dominance (measured by an importance value index, IVI_i) and used abundance–size correlations to select those species suitable for passive and/or active restoration of disturbed riparian vegetation in the Lacandonia region, Southern Mexico. We sampled riparian vegetation in a 50 × 10–m transect in each of six reference (RE) and five disturbed (DE) riparian ecosystems. Those species representing more than 50% of total IVI in each ecosystem were selected, and Spearman rank correlation between abundance and diameter classes was calculated. For eight species, it was determined that passive restoration could be sufficient for their establishment. Another eight species could be transplanted by means of active restoration. Five species regenerate well in only one ecosystem type, suggesting that both restoration strategies could be used depending on the degree of degradation. Finally, two species were determined to not be suitable for restoration in the RE (based on the above selection criteria) and were not selected during this initial stage of our restoration project. The high number of tree species found in the RE suggests that the species pool for ecological restoration is large. However, sampling in both ecosystem types helped us reduce the number of species that requires active restoration. Restoration objectives must guide the selection of which methods to implement; in different conditions, other criteria such as dispersal syndrome or social value could be considered in the species selection.

Key words: indicators, Lacandonia, natural regeneration, rainforest, recovery.

Introduction

An aim of ecological restoration is to reestablish the characteristic species assemblage in a degraded or destroyed ecosystem and appropriate community structure occurring in the reference ecosystem (Society for Ecological Restoration International Science and Policy Working Group, SER 2004). Many tropical and humid temperate ecosystems can recover with little or no human intervention when the soil has not been severely degraded (González-Espinosa et al. 2007). In these cases, "cessation of activities that are causing degradation or preventing recovery" (passive restoration, Kaufmann et al. 1997) is enough to drive ecosystem recovery, and can be considered the first step in ecological restoration (Rey-Benayas et al. 2008). However, although passive restoration sometimes may be sufficient for some species, others need active restoration. Revegetation—the deliberate introduction of native species—is one of the tools most frequently used in ecological restoration, but it is usually time-consuming and expensive. Therefore, distinguishing species that can be passively restored by natural regeneration from those species requiring active restoration can greatly reduce the cost and effort of a restoration project. However, making this determination is not simple. Our main goal in the initial stage of this restoration project, based in the Lacandonia region of Southern Mexico, is selecting species of riparian vegetation for passive and active restoration.

Methods

The study was conducted in Marqués de Comillas Municipality (16°54′N, 92°05′W) in the Lacandonia region, Southern Mexico. Mean annual precipitation is about 3,000 mm and a short dry season (<100 mm/month) occurs between January and April (Martínez-Ramos et al. 2009). Humans settled in this region during the early 1970s and former rainforest has been extensively converted to agricultural fields (De Jong et al. 2000).

Our reference ecosystem (RE) consisted of six pristine riparian areas. Our disturbed ecosystem (DE) included five areas that were completely deforested, and later abandoned for 3–10 years. Presently, DE areas are covered by secondary riparian vegetation. In each study area, we sampled riparian

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