



## **Collaboration for Environmental Evidence**

### **Systematic Review No. 73**

#### **DO TREE PLANTATIONS SUPPORT HIGHER SPECIES RICHNESS AND ABUNDANCE THAN PASTURE LANDS**

#### **Review Summary**

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**Cover Sheet**

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## **Summary**

### **1. Background**

Increased worldwide demand for wood products, coupled with public concern over the loss or degradation of natural forests, has led to a steady increase in plantation establishment throughout most regions of the world. Most of the world's new plantations are generally established on former agricultural lands that are often of declining economic value for grazing or cropping. There is an expectation that when established within intensively used landscapes, plantations can contribute positively to biodiversity conservation.

### **2. Objectives**

We conducted a systematic global review of differences between timber plantations and pasture lands in terms of animal and plant species richness and abundance, and assessed the results using meta-analysis techniques. Our principle aim was to test the hypothesis that plantations contain higher species richness or abundance than pasture.

### **3. Methods**

We searched multiple electronic databases and the internet using different combinations of Boolean search-terms. Search terms were run in separate or limited combinations depending on the requirements or limitations of the database used. We also obtained papers from colleagues and through reference lists from published studies including major review articles and books on plantations. Furthermore, we obtained information from some government studies and reports. Data were available for meta-analyses comparing the species richness and abundance of plantations and pasture lands for five taxonomic groups: plants, invertebrates, reptiles/amphibians, mammals, and birds. Studies that provided estimates of mean species richness and/or abundance, and the corresponding estimates of standard deviations and sample sizes, were included in the meta-analysis.

### **4. Main results**

Our systematic literature search identified 1,967 articles of potential relevance to our study. Of these articles, 66 provided biological monitoring information for plantations and pasture lands. Of these, 30 articles were excluded from the meta-analysis due to their lack of provision of information necessary for the analysis (eg. sample size, mean, or standard deviation). No articles were excluded due to problems

with experimental design, which were not already excluded on other grounds. In total, 36 primary studies met our criteria for inclusion within the meta-analysis (Table 1). Studies varied widely in the information provided about factors affecting the species richness or abundance of different taxa within pastures and plantations. We were limited to assessing those factors that were consistently reported in the literature. The majority of studies provided multiple contrasts of species richness and/or abundance between pasture lands (control) and plantations (treatment). Some studies contrasted multiple treatments to a common control, and others contrasted multiple controls to a common treatment, hence creating divisions within studies.

Within each taxon there was considerable variation in the difference between species richness and abundance between plantations and pasture lands. Birds and reptile/amphibians exhibited significantly higher species richness, and mammals exhibited significantly higher abundance, in plantations than in pasture lands which lacked remnant vegetation. Reptile/amphibian species richness was significantly higher in plantations in general. No significant differences in species richness were found for mammals, plants, or invertebrates, and no significant differences in abundance were found for birds, reptiles/amphibians, invertebrates, or plants.

## **5. Conclusions**

We found that for most taxa, plantations and pasture lands were not sufficiently consistent in their impact on species richness or species abundance to allow for general conclusions regarding their relative biodiversity value. Some taxa did have higher species richness or abundance in plantations than in pasture lands. However, it is only within the presence of taxonomic caveats (ie. reptiles/amphibians), or specific landscape features (ie. absence of remnant vegetation within pasture), that it can be concluded that plantations support higher species richness or abundance than pasture land. We emphasize that caution is warranted when making general statements about the inherent biodiversity value of diverse and broadly-defined land-uses.