

Agroforestry and biodiversity

Reference 8

Palacios, CP; Aguero, B; Simonetti, JA. 2013 Agroforestry systems as habitat for herpetofauna: is there supporting evidence? *Agroforest Syst* 87:517-523. doi: 10.1007/s10457-012-9571-z

Background and objective

Habitat structural changes are a presumed leading cause of species decline, as herpetozoans add up to 48 % of terrestrial animal species which are threatened by agroforestry and forestry activities. This study focuses in the response of the herpetofauna to agroforestry and forestry plantations, assessing if there is supporting evidence that these plantations could support amphibians and reptile biodiversity as occurs with birds and mammals.

Search strategy and selection criteria

Information of herpetozoans in agricultural and forestry plantations was gathered through a review of the ISI Web of Knowledge, EBSCO, Scielo and Scholar Google databases for articles published between 1986 and 2012 dealing with amphibians and reptiles diversity and abundance in forestry and agroforestry plantations, using the search terms amphibian* + plantation, *reptile* + plantation, *reptile* +planted forest* and reptile* + agroforestry*. An additional search was conducted for the same taxa adding specific type of plantations such as oil palm, pine, eucalyptus, and cacao. Relevant publications cited in the retrieved works were also included when they were not captured in the databases. Articles were collated into those who compared richness and/or abundance between forests and plantations and those who compared plantations with different structural complexity. Plantations exhibiting a single species canopy cover or those with scarce or nil understory cover were regarded as simple. Plantations with multiple vegetation strata, multiple species canopy cover or dense undergrowth were regarded as structurally complex.

Data and analysis

From each case, information regarding the type of plantation, species richness (assessed either as mean species numbers per sampling unit or the total number of species) and abundance (expressed either as the mean number of individuals across all species per sampling unit or the total number of individuals) were extracted. Changes in richness and abundance were statistically tested through sign tests, comparing the frequency of cases where the number of species or individuals in a plantation increased or decreased compared to the native forest. Other test, like log response ratio tried to be used but incomplete data reporting in several publications precluded the analysis of the effect sizes. Similarly, changes in richness and abundance in complex plantations compared to simple ones were also tested through sign tests.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
27	Agroforestry and forestry plantations.	Plantation and Agroforestry (of simpler level of complexity when compared to complex plantation)	Native forest or Complex plantation	Change in richness or abundance between native forest and plantation or between complex plantations and simple plantations (sign).	38%

Results

- Amphibians and reptiles responded differently to the transformation of forests into plantations. Species richness of amphibians was significantly lower in plantations than in forests, holding fewer species in 68 % of the cases.
- While the number of reptiles species in plantations was higher in 43 % of cases, difference was not significant, although this might be due to low statistical power. Three studies dealt with reptile assemblages in relation to structural complexity of plantation, which suggest that species richness and abundance is higher in complex plantations.
- Total abundance of amphibians does not significantly increase in plantations. The abundance of reptiles increases significantly in plantations, plantations supporting more individuals in 81 % of cases.
- The presence of threatened amphibian species decreases in plantations compared to forests. Species listed in all categories but Vulnerable exhibited lower abundance in plantations than in forests.
- Agroforestry and plantation systems were not distinguished.

Factors influencing effect sizes

Taxa: Amphibian and reptiles respond differently to the transformation of forest to plantation.

Conclusion

Among amphibians, species richness is lower in plantations than in forests while among reptiles there is no significant difference. The abundance of reptiles increases in plantations.