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The width and biotic integrity of riparian forests affect richness, abundance, and composition of bird communities

Camila Crispim de Oliveira Ramos[a,*], *Luiz dos Anjos*[b]

[a] *Programa de Pós-graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá – UEM, Maringá, PR, Brazil*
[b] *Departamento de Biologia Animal e Vegetal, Universidade Estadual de Londrina – UEL, Londrina, PR, Brazil*

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ABSTRACT

In riparian forests, width contributes most importantly to maximizing diversity. Therefore, corridors with different widths should differ in richness, abundance, and composition. We tested this hypothesis for the bird communities of two forests on the Upper Paraná River floodplain, Paraná, Brazil. Richness and abundance were higher in riparian forest with mean width of 50 m in each margin and lower anthropogenic disturbance. Species diversity increased 30%, with increase in total width from 40 m to 100 m on average. Bird species composition also differed, and groups with the strictest ecological requirements were better represented in the wider, better-preserved forest. This indicates that conservation of riparian forests has a positive effect on their bird communities. We suggest that these environments are prioritized for recuperation, and that a 50 m width on each side of a stream is necessary for riparian forests to effectively fulfill their function in the landscape. We also note that the recently discussed Brazilian Forest Code does not conform to this requirement.

Introduction

In fragmented landscapes, the survival of species depends on their ability to persist in fragments and/or move across the landscape (Lees & Peres 2008). Riparian forests are important corridors for many biological groups in fragmented landscapes, because they promote increased connectivity and hence species richness and flow of individuals (Lees & Peres 2008). These corridors increase genetic variability (Vieira & Carvalho 2008) and local biodiversity (Anjos *et al.* 2007), reduce climatic variations and their consequences (Marini *et al.* 2009), and allow forest organisms of adjacent biomes to disperse (Silva 1996). Riparian corridors are essential to maintain the diversity of plant and animal communities in many biomes, particularly in the Atlantic Forest (e.g., Metzger *et al.* 1997; Anjos *et al.* 2007).

*Corresponding author at: Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá, Av. Colombo, 5790, PEA, Bloco G90, 87020-900, Maringá, PR, Brazil.
E-mail address: mila_bru@yahoo.com.br (C.C.O. Ramos).
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The available forest area along bodies of water is an important factor affecting the richness and species composition of a wide variety of organisms (Vieira & Carvalho 2008; Tubelis *et al*. 2004). The width of riparian corridors is the most important factor benef ting biodiversity, and maximizing this width improves habitat quality by reducing edge effects (Metzger 2010). Other factors including the length, continuity, and degree of conservation of corridors (Lees & Peres 2008); and the surrounding matrix type, topography, and extent of the areas of riparian influence (Metzger *et al*. 1997) also influence the quality of riparian corridors.

The protection of these corridors, although present in the former Brazilian Forest Code (Federal Law No. 4.771 of September 15, 1965), was not effective. It is common to observe properties that contravene it, where the permanent preservation areas (PPA) along streams are fully or partially occupied (Sparovek *et al*. 2011). According to this law, riparian forests on the margins of streams up to ten meters wide should be 30 m in width on each side, but the new Forest Code provides for regularization of deforestation in areas of consolidated use, with reconstitution of the PPA, according to farm size. This reconstitution would be negligible, ranging from f ve meters on each side to a maximum of 15 m, and still allowing the use of these areas for activities of agroforestry, ecotourism, and rural tourism. Thus, the recovery of the functionality of this environment is compromised, since there will be no more incentive to restore them and their use and exploration will still be allowed (Sparovek *et al*. 2011).

In this context, we evaluated two riparian forests of different widths, with respect to the richness, composition, and abundance of their bird species. We tested the following hypotheses: the wider riparian forest (with less anthropogenic disturbance) will support greater species richness and abundance of individuals than the narrower forest (with greater anthropogenic disturbance); and species composition will differ between the forests, despite their spatial proximity (6 km apart). If these assumptions are correct, narrow riparian forests have limited importance for biodiversity conservation of forest birds in areas where loss of forest habitat is extreme and most remnants are restricted to the margins of water bodies.

Methods

Study areas

The study was conducted on the Upper Paraná River floodplain (UPR) in northwestern Paraná state, Brazil. This area is a transitional zone of the Atlantic Forest with the Cerrado (Mendonça *et al*. 2009). The riparian forests studied are west of the Paraná River, at an altitude of approximately 260 m, bordering the Caracu stream (22°45'55" S and 53°15'30" W, 4.5 ha), and the São Pedro River (22°44'58" S and 53°13'24" W, 11 ha) (Fig. 1). Both forests were intensively exploited and degraded by farming and urbanization, but in the last decade

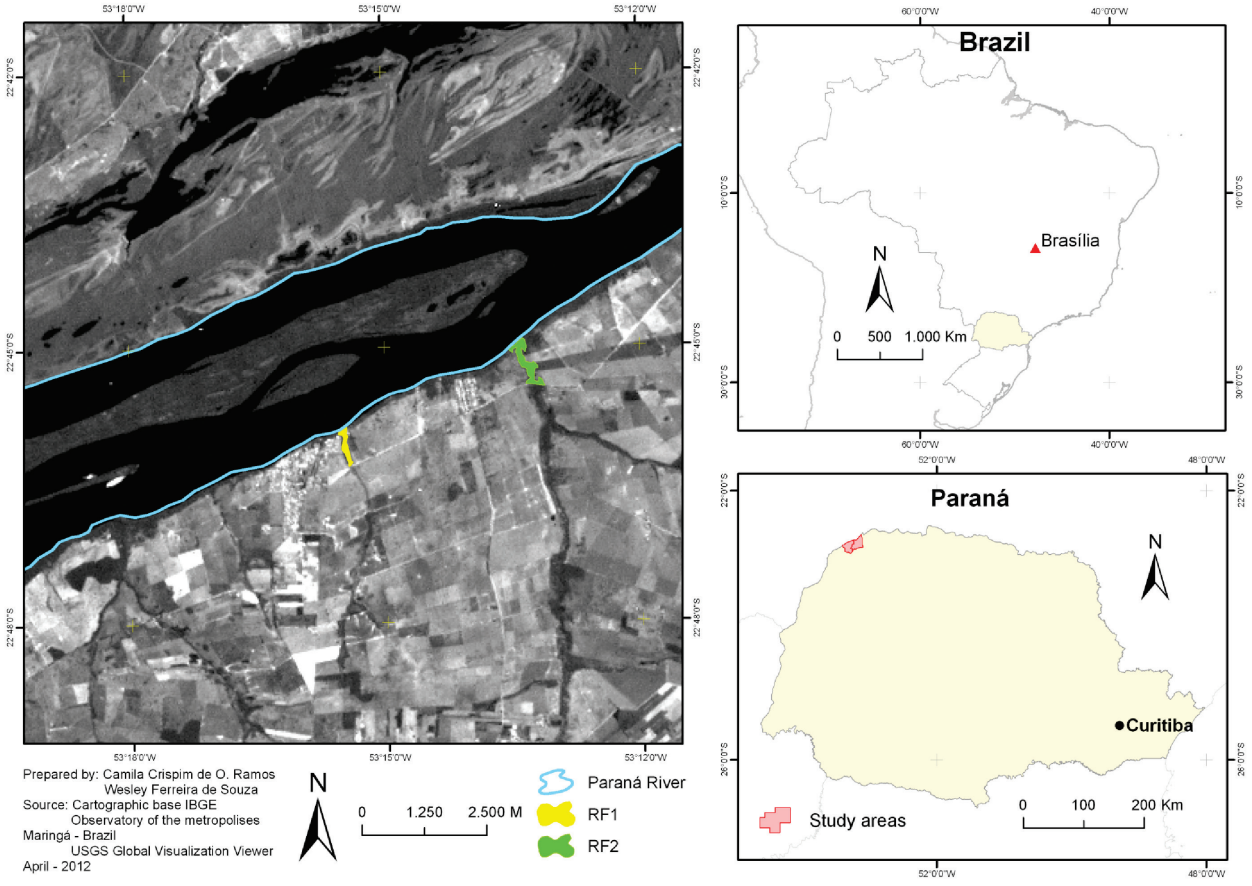

Fig. 1 – Map of the Upper Paraná River floodplain, showing the riparian forests studied.