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Editorial

The river-floodplain ecosystems present high environmental heterogeneity and, consequently, high biodiversity (Tockner et al., 1999; Ward & Tockner, 2001; Thomaz et al., 2004). Connectivity is a characteristic of this kind of ecosystem that is fundamental for its functionality, once it allows the exchange of species, energy, and matter between different habitats (Amoros & Roux, 1988; Pringle, 2001). The larger source of anthropogenic impact on the great fluvial systems around the world is habitat fragmentation due to dam construction, mainly when disposed in cascades (Nilsson et al., 2005; Winemiller et al., 2016). Damming causes reduction in connectivity, alteration in river flow, seston retention, increase in water transparency, and decrease in nutrient concentration (Stanford & Ward, 2001; Thomaz et al., 2007; Agostinho et al., 2008; Souza-Filho, 2009). Consequently, there is oligotrophication and discontinuity in physical and biological characteristics in these habitats (Agostinho & Zalewski, 1995; Barbosa et al., 1999).

The impacts of reservoirs have been widely documented in the last dam-free stretch of the Paraná River. This stretch extends for 230 km and is located downstream of a cascade of 34 large reservoirs (Thomaz et al., 2004; Agostinho et al., 2008; Roberto et al., 2009). In this stretch, the Paraná River runs in a wide anastomosed canal with reduced declivity (0.09 m/km). A wide floodplain is located on its right margin, with maximum width of 20 km, and containing numerous secondary canals, lakes, and rivers. In this floodplain, sediments carried by the river give origin to river bars and approximately 300 islands (Agostinho & Zalewski, 1995).

This stretch of the Paraná River has been studied since 1986 by researchers of the Research Center in Limnology, Ichthyology and Aquaculture (Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura - Nupélia) of the State University of Maringá (Universidade Estadual de Maringá). The developed studies draw the attention to the importance of this area for the maintenance of the Brazilian biological heritage. As a recognition of this importance, two federal (Environmental Protection Area of the Islands and Lowlands of the Paraná River and Ilha Grande National Park) and one state conservation unit (Ivinheima State Park/MS) were created. In the last years (2000-2016), this region has been subject of a program of Long Term Ecological Research (PELD/CNPq site 6). Results of this study have indicated that the Paraná River and adjacent environments connected to it have been suffering an oligotrophication process due to sedimentation of particulate material in upstream reservoirs, especially in Porto Primavera Dam. This process has been evidenced in the marked increase in water transparency and decrease in phosphorous concentrations in the Paraná River main canal. This effect may be amplified in the entire floodplain and, in the long term, may result in negative consequences for the ecological integrity of this system (Roberto et al., 2009; Agostinho et al., 2013). The decrease in species number and biomass of planktonic populations has been observed in the main canal of the Paraná River and adjacent environments of the region located immediately downstream from Porto Primavera Dam (Bonecker et al., 2009; Rodrigues et al, 2009). Therefore, this last dam-free stretch of the river-floodplain system of the High Paraná River has been considered adequate to test the Serial Discontinuity Concept (SDC; Ward & Stanford, 1995). This concept postulates that great rivers affected by damming, but which possess stretches free of anthropic intervention, may be restored due to the contribution of adjacent environments and tributaries to the reestablishment of the natural conditions and attributes that have been altered (Stanford & Ward, 2001).

One concern is if the environmental and connectivity modifications imposed by reservoirs hamper the dynamics and establishment of species adapted to the original conditions of the systems (Bovo-Scomparin et al., 2013). Moreover, such modifications may favor the emergence and dominance of non-native species to the detriment of local species (Vitule et al., 2012; Daga et al., 2014; Pelicice & Agostinho, 2009; Thomaz et al., 2009; Agostinho et al., 2009).

Besides questions of scientific interest, we considered that there was the necessity of contributing to an environmental evaluation that would give support to managers in decision-making. We aimed at supporting decisions made by both state and federal managers, related to conservation units and to anthropogenic impacts, as hydroelectric development in the drainage basin.

Both approaches have guided the development of a scientific project in this river stretch, and results obtained from it have allowed scientific production that compose this special section of Acta Limnologica Brasiliensia. In this special section are published 21 papers that investigate different ecological aspects of distinct aquatic communities. Studies are mainly related to responses to the longitudinal gradient formed between Porto Primavera and Itaipu reservoirs, which represents the last dam-free stretch of the Upper Paraná River.

These studies have identified the existence of a longitudinal gradient of phosphorous concentration and suspended particulate matter and organisms. One study shows that the oligotrophication effect caused by reservoirs in the upper portion of this free stretch decreases along the longitudinal gradient due to suspended material supply by tributaries and adjacent lakes. Thus, the supply promoted by such influx to the river canal and connected habitats can decrease the oligotrophication effect caused by upstream cascading reservoirs (Santana et al., this section).

Two studies have demonstrated that, besides to the contribution of organic matter and nutrients, tributaries along the right margin of the Paraná River drain the floodplain, and together with marginal lakes are responsible for the biodiversity recovery (Jati et al., this section and Bomfim et al., this section) Other studies also showed that tributaries may be considered as fish species incubation and storage areas (Pelaés et al., this section and Silva et al., this section). Similarly, several studies that investigated the effect of the longitudinal gradient in this last dam-free stretch of the Upper Paraná River on zooplânkton and periphytic algae and ostracods shown that such connected environments strongly contribute to the maintenance of diversity in the canal of the Paraná River and specially to an increase in regional biodiversity (Bichoff et al., this section; Higuti et al., this section; Negreiros et al., this section and Palhiarini et al., this section).

On the other side, tributaries on the left margin of the Paraná River, which have drainage basins occupied by extensive agriculture, contribute mainly with nutrients and suspended inorganic particulate matter. One of the studies on phytoplankton community has shown that Paranapanema River is an exception which, being intensively altered by damming, contributes to the Paraná River with few nutrients and little particulate inorganic material, but with great Cyanobacteria biomass (Jati et al., this section), an undesirable group of native algae, due to its potential for producing extensive blooms of high toxicity (cyanotoxins).

Thus, reservoirs upstream of the floodplain, principally Porto Primavera (Paraná River) and Rosana (Paranapanema River) may serve as incubators and dispersers of exotic and/or invasive species for many aquatic communities. The constant influx of inocula of these species added to the oligotrophication effect has been causing a decrease in species richness in the Paraná River canal and marginal lakes in the upper portion of this river stretch (Bortolini et al., 2017). However, some of the research that is part of this special session did not yet verify the establishment of undesirable species, at least in the inferior portions of this dam-free stretch, evidencing the importance of environmental filters in biotic homogenization control and species invasions (Hernandes-Silva et al., this section; Jati et al., this section and Souza et al., this section).

Other aspects of aquatic communities and of the environmental dynamics of this floodplain were also approached in this special section. Several studies investigated the role of connectivity and seasonality in community structure, as well as the importance of space and environmental filters in the structure and dynamics of phytoplankton (Pineda et al., this section and Zanco et al., this section), plankton Ciliates (Pauleto et al., this section), Chironomidae, Oligochaeta and fishes of rivers and lakes (Pinha et al., Amo et al. and Santos et al.), and even of phytotelmata communities (Amadeo et al., this section). Other study investigated the trophic interactions between microbial communities and the role of top-down and bottom-up effects on the abundance patterns and size structure of plankton Ciliate community

(Ramos et al., this section). Finally, also the description of a new species of fish parasite in the floodplain of the Upper Paraná River has been included in this section (Santos et al., this section).

The papers that compose this special section of Acta Limnologica Brasiliensia have evidenced the existence of a longitudinal gradient in nutrient concentration and suspended material along the last dam-free stretch of the Upper Paraná River. This gradient is influenced by tributaries and by the floodplain, and biotic communities respond to it. The gradual enrichment of the system has affected diversity and abundance patterns of the aquatic communities.

We hope that information contained in this special section encourages new research that investigates the importance of tributaries and floodplain systems in the maintenance of biodiversity in other large rivers. We also expect that results published in this section serve as subsidies to the management of the Upper Paraná River floodplain.

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