

Long-term morphologic and hydrologic effects on benthic invertebrates in a minor channel of the Paraná River floodplain (Argentina)



Martín C.M. Blettler^{a,*}, Mario L. Amsler^a, Inés Ezcurra de Drago^a, Juan M. Bullo^b, Aldo R. Paira^a, Edmundo E. Drago^a, Luis A. Espinola^a, Livia O. Fontana^a, Eliana Eberle^a, Alberto Rodrigues-Capítulo^c

^a Instituto Nacional de Limnología (INALI-CONICET-UNL), Ciudad Universitaria 3000, Santa Fe, Argentina

^b Universidad Nacional del Litoral (UNL), Ciudad Universitaria 3000, Santa Fe, Argentina

^c Instituto de Limnología "Dr. Raúl A. Ringuelet" (UNLP-CONICET), C.C. 712, 1897 La Plata, Argentina

ARTICLE INFO

Article history:

Received 17 September 2013

Received in revised form 25 February 2014

Accepted 31 March 2014

Available online 20 April 2014

Keywords:

Eco-geomorphology

Long-term study

Morphological evolution

River regime variability

Benthic macroinvertebrates

ABSTRACT

Temporal variability in river morphology, sedimentology and flow are a fundamental control on instream habitat structure and riverine ecosystem biodiversity. However, long-term riverine ecological time-series in a wider temporal context are particularly rare. The present research involves long-term data series of riverine physical habitat and benthic macroinvertebrate ecology in the Correntoso River (secondary channel of the Paraná River floodplain).

An anthropogenic morphological alteration was identified at the river inlet. As a consequence, a large sedimentation area was originated at the river inlet, preventing the inflow of suspended sand to the Correntoso. However, the natural morphological evolution during the last decades, probably led by three large floodings (1983, 1992 and 1997–8), reconfigured the inlet morphology, allowing the inflow of suspended sand into the channel. These phenomena allowed the sandy sedimentation a few kilometers downstream, redefining its bottom sediment condition over the years. This long-term process prompted great changes on benthic invertebrate ecology, causing a significant fauna depletion.

This research demonstrates the value of long-term data series in ecological studies as well as the importance of an interdisciplinary point of view. Linking physical processes to ecology is particularly useful to aid understanding of the ecological legacy of anthropogenic modification and natural evolution on river systems.

© 2014 Elsevier B.V. All rights reserved.

1. Introduction

This study is framed into the field of eco-geomorphology. Researches under this theme operate at the interface of ecology, hydrology and geomorphology, integrating these well advanced disciplines (Dunbar and Acreman, 2001; Fagherazzi et al., 2004; Wood et al., 2007). This multidisciplinary concept also considers morphological changes induced by anthropological action and its ecological consequence.

It is relatively well known that river discharges may influence instream organisms and communities in multiple ways (flow disturbance), through changes in channel morphology and habitat characteristics, erosion and deposition of sediments, accidental organisms drift, transport and delivery of food resources, etc. (Lake, 2003; Matthaei et al., 2003; Rabeni et al., 2005). Hence, variations in the hydrological levels and discharges have a great influence on the benthic invertebrate assemblage (Daufresne et al., 2004; Bêche et al., 2006; Jackson and Fureder, 2006; Bonada et al., 2007; Dewson et al., 2007; Griswold et al., 2008; Monk et al., 2008; Durance and Ormerod, 2009; Poff et al., 2010; Blettler et al., 2012). Due to this high sensitivity of aquatic organisms, the influence of long-term hydrological changes has been investigated with increasing intensity in the last decades (e.g. Poff, 2002; Palmer et al., 2008, 2009). This kind of hydrological research has been also carried

* Corresponding author. Tel.: +54 342 4511645/48; fax: +54 342 4511645/48.

E-mail addresses: martinblettler@hotmail.com, mblettler@inali.unl.edu.ar (M.C.M. Blettler).

out in the Paraná River basin (Marchese and Ezcurra de Drago, 1992; Marchese et al., 2002; Drago et al., 2003; Blettler et al., 2008; Behrend et al., 2009).

However, attempts to quantify macroinvertebrate community response to river flow variability and morphological evolution are currently limited in terms of their temporal and geographical coverage (e.g. Suren and Jowett, 2006). Reasons for this knowledge gap could be the lack of an appropriate framework that enables

different disciplines to collaborate in an interdisciplinary setting (Petts, 2000) and the requirement of long-term ecological time-series involving one or more decades (Monk et al., 2006). In this sense, this study comprises an extensive dataset of morphologic, sedimentologic, hydrologic and hydraulic measurements coupled with benthic samplings at the Correntoso River, a minor secondary channel of the large Paraná River floodplain. This database involves the period from 1987 to 2000, including regular as well

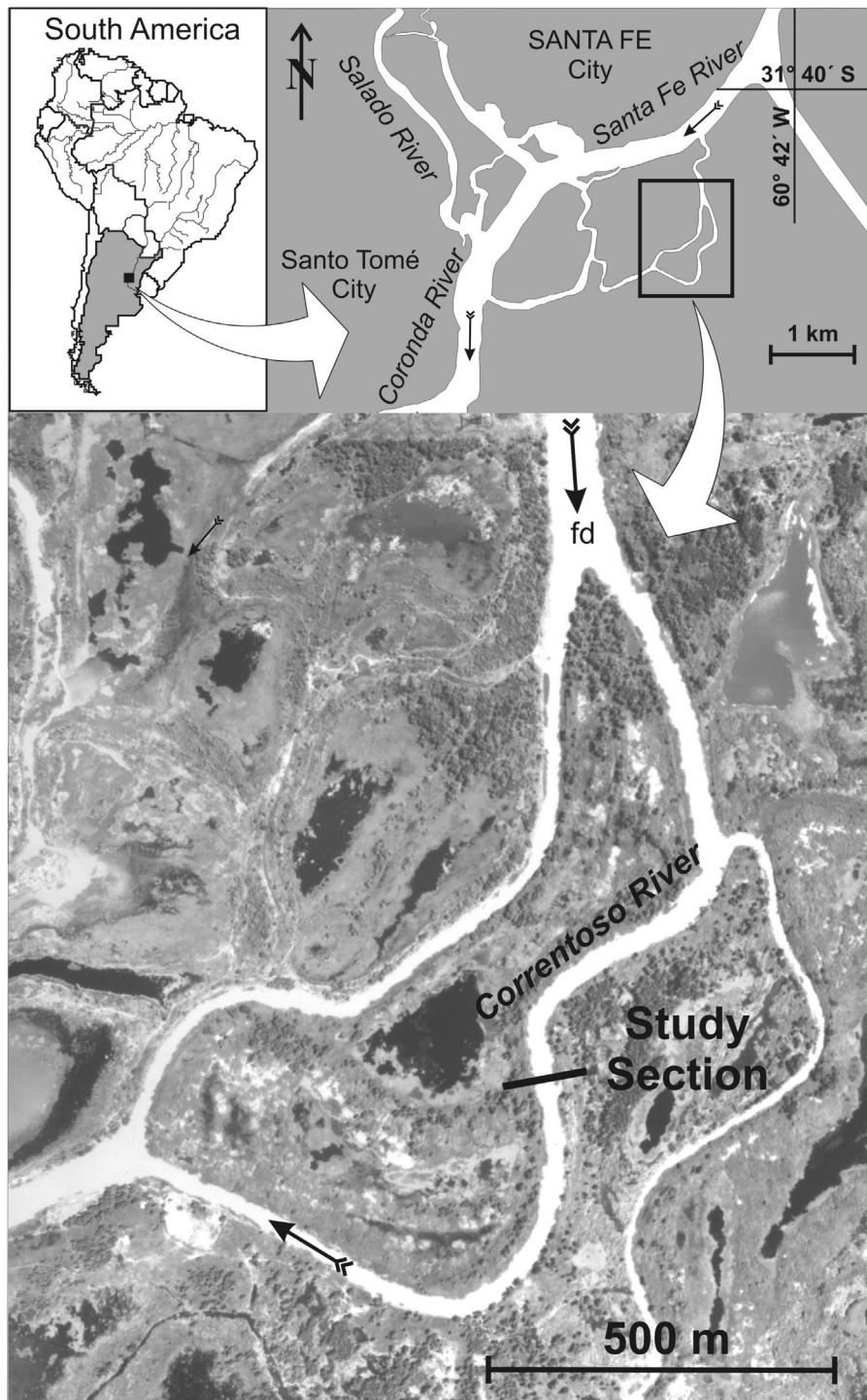


Fig. 1. Location of the study area and details of the sampling stations at the selected straight section.

Download English Version:

<https://daneshyari.com/en/article/4389423>

Download Persian Version:

<https://daneshyari.com/article/4389423>

[Daneshyari.com](https://daneshyari.com)