Brazilian articles in international journals on Limnology

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We assessed the contribution of Brazilian limnologists (freshwater ecologists) in international journals in the period 1970–2004. Brazilian contribution was low and regular in the 1970’s, but increased steeply after 1980 with no signs of stabilization until the present. Articles authored by Brazilians tend to be less cited than articles authored by non-Brazilians, although this difference is reduced in co-authored articles with international researchers. Brazilian articles are not distributed homogenously among the sub-areas of Limnology, but present some biases that can be explained by intellectual legacy. Brazil has invested since the 1970’s in establishing postgraduate courses in Brazil and in the last years has turned the focus to a better qualification of these courses. We believe these are the main reasons for the conspicuous development of Brazilian Limnology.

Introduction

Scientific production in Latin America increased steeply in the last 20 years. Between 1998 and 2001, the number of articles published in journals indexed by the Institute for Scientific Information (ISI) tripled (5,609 to 16,329) (HILL, 2004). Most of these articles are from authors in Brazil, Mexico, Argentina, and Chile (HILL, 2004), the countries with the highest investment in research and development in the region (MACILWAINE, 1999a). Brazil rank first in the region, and during the same period (1998–2001) experienced an increase even above the average, quadruplicating its number of articles (1,766 to 7,205) (HILL, 2004). Despite the remarkable increase in scientific production, the Brazilian percent share of articles produced in the world is still low (1.21% for the 1997–2001 period), as is the percent of citations received by Brazilian publications (0.71% for the period 1997–2001) (KING, 2004). Compared to the 149 top performing countries in the period 1993–2003, Brazil occupies rank 22 and 25 in number of articles and citations respectively in the ISI database. However, impact of Brazilian articles in terms of received citations is low and the country ranks 94 among the 149 top countries (data from ISI Essential Science Indicators consulted in August 2005 – http://www.in-cites.com/research/2004/march_22_2004-4.html).
In recent years, a number of studies have examined in detail the performance of Brazil in selected fields, such as Health Sciences (PEREIRA & ESCUDER, 1999), Management Sciences (PEREIRA et al., 2000), and Psychiatry (LETA et al., 2001; FIGUEIRA et al., 2003). In this paper we examine the development of Limnology (the study of inland waters) in Brazil in the period 1970–2004. We restricted our focus to Brazilian publications in journals indexed by ISI, which currently does not include any Brazilian journal in the field. Our study thus does not deal exactly with the total trend in the field, but specifically how Brazilian Limnology has evolved in the international scenario.

Brazil is the fifth largest country with 8,547,403 km², and includes 53% of South American waters and 12% of all continental waters in the world. Despite harboring a reduced number of natural lakes, huge water basins are located within Brazil, such as the Amazon (6,112,000 km²), Paraná (877,000 km²) and São Francisco (634,000 km²). The country also encompasses most of the Pantanal, a flat area seasonally flooded in the heart of South America of nearly 250,000 km². Additionally, Brazil has most of its energy derived from hydroelectric plants, which include huge man-made lakes (reservoirs) (TUNDISI, 1980). With such a variety of freshwater ecosystems, Brazil leads inland water biodiversity in the world (AGOSTINHO et al., 2005). Taking into account the huge numbers cited above, we should expect a good development of Brazilian Limnology; if not in relation to that observed in developed countries, at least in relation to other science fields within the country.

In short, we asked: i) What is the relative contribution of Brazilian Limnology in international journals? ii) Is there any trend in this contribution during the period 1970–2004? iii) Is the contribution of Brazilian limnologists spread among journals or is concentrated in a particular group? iv) Do Brazilian articles receive the same frequency of citations than articles from other countries? v) What is the effect of type of co-authorship, number of authors and article length on the frequency of citation? vi) Is the Brazilian contribution equally spread among sub-areas or concentrated in a few of them? vii) Which Brazilian states and institutions are responsible for most of the articles published in international journals?

**Methods**

We assessed the contribution of Brazilian articles in international journals in two ways. Firstly, we selected 13 international journals on limnology indexed by Thomson ISI (formerly Institute for Scientific Information) (www.isiknowledge.com) (Table 1). Selected journals were chosen from the 83 journals listed by ISI in the fields “Limnology” and “Marine and Freshwater Biology”. The list of selected journals contains representatives of most of the sub-areas of Limnology. We avoided journals in which most of the articles were restricted to taxonomy/systematics (e.g. *Aquatic*...