

Article

Visibility of latin american scientific publications: the example of Bolivia

Silvia Cristina Pabón Escobar

Maria Conceição da Costa

The discussion on the state of the art of scientific publications in Latin American countries generally restricts itself to its supposedly low visibility. This affirmation is generally conditioned to the exclusive use of large international databases, mainly of the USA and Europe, which include thousands of scientific publications that have marginalized a large part of the scientific literature produced in peripheral countries.

Given this fact of low visibility, it became imperative for some Latin American countries, beginning in the 90s (20th Century), to develop their own mechanisms of projection of the results of their own scientific production. The experiences constitute an example for countries that, having significant scientific production, still do not have the means to facilitate access to local scientific publications.

Although Bolivia still remains distant from these initiatives, a series of studies were identified that show the existence of a tradition of publication in scientific magazines and interest in their visibility, on a local and international level, which demands attention to the most adequate mechanisms in order to carry this out.

Introduction

In this article we deal with the topic of the visibility of scientific publications (periodicals), beginning with the existence of international databases as essential mechanisms in order to make scientific knowledge accessible and visible.

With the creation of databases in the mid-20th Century, the scientific production of developed countries became accessible to the international scientific community. In the 70s, peripheral countries, apparently excluded from this process, showed that the tradition of publishing in prestigious magazines was not restricted only to industrially advanced countries. However, the presence of these countries was shown to be superior.

A common question among Latin American researchers is if it would be possible, and even necessary, to reach the levels of scientific production of more advanced countries. A possible answer is that there is no reason to go in search of an objective of such complexity, given that the two scientific contexts are very differentiated. However, making the results of national scientific production available is perceived as indispensable in some Latin American countries, at least in local and regional databases, given the fact that significant scientific production exists which is still unknown.

In search of spaces for their scientific publications, some Latin American countries have recently begun to organize these publications into local bases. This is being done not only with the objective of storing, disseminating and evaluating scientific production, but also, we suppose, in order to qualify these publications for future external visibility.

The imperative of communicating science

The dissemination of research results through the publication of scientific articles, particularly in magazines, has become one of the most used mechanisms by the scientific community in order to

legitimize its activity and, with time, has extended itself to the social organization of science. According to Derek de Solla Price “scientific research which is not published does not exist”¹. This is the way that the system of scientific production in developed countries has worked since the middle of the 19th Century. This assertion, which is widely accepted by the international scientific community, has also influenced Latin American scientists.

Vessuri mentions that publishing “(...) assures the priority in the production of a result, adds to the academic credit of a scientist, legitimizes his or her activity, and permits the existence of scientific systems of communication which are linked to active processes of persuasion, negotiation, refutation and modification, through which the meaning of scientific observations, similar to theoretical interpretations, tends to be selectively constructed and reconstructed in the scientific field”².

Socializing, showing the results of scientific research has thus become indispensable, in large part for academic recognition (although this is not the only function of scientific publication). Recognition, for those whose work contributes to the development of ideas from different fields, is one of the functions of science³.

Finally, it is considered that science should be seen as a broad social system, a diffuser of new ideas and of knowledge. In sum, it is possible to affirm, from the point of view of the scientific community in general, that publishing is an imperative. The quantity of articles published by Latin American countries is already the domain of bibliometric and scientometric studies, of which we will now speak.

The tradition of quantitative studies in the view of Latin America

Bibliometry and scientometry are terms that refer to the quantitative measurement of scientific production. They use mathematical models – in the former, in order to elaborate forecasts and support decision-making and, in the latter, in order to study science as an “economic discipline or activity”⁴. In both cases, the advances of automation and information technology aided their development and consolidation, particularly in relation to the evaluation of scientific publications.

It is particularly of interest to us to approach the term bibliometry from the definition of the Organization for Economic Cooperation and Development (OCDE)⁵: “instrument which permits observation of the state of science and technology through the production of scientific literature as a whole, at a determined level of specialization. Bibliometry is a means of situating a country’s production in relation to the world, an institution in relation to its country and even scientists in relation to their own communities”⁶.

Studies of the products or results of scientific processes have as their main reference the Institute of Scientific Information (ISI), created in the USA by Garfield in 1963, and the Science Citation Index (SCI), as the most utilized instrument by researchers and specialists in bibliometry (for its wide reach, volume of periodicals, compilation of citations, among others). This does not mean that it is representative all over the world, one reason being the concentration of periodicals in English. For this reason caution is advised in using the data which it provides⁷.

The critique which several Latin American countries make of the model proposed by ISI is that of the depth of asymmetry between scientifically advanced countries and those which are developing. One of the consequences is that many regional researchers prefer to send their better works to mainstream magazines, leaving works of lesser quality and scope for national magazines⁸.

Another explanation for the growing distance between countries is the bias that arises in benefit of North American science, which gains more visibility in detriment of a sub-representation of periodicals and, therefore, of publications of other countries, especially of those which are not developed and/or emerging, where the official language is not English⁹.

The greatest critique and concern are produced when one realizes that the responsible committees apply admissions criteria in different ways, according to the country of publication¹⁰. Furthermore, the identification of nuclear magazines is considered inadequate. Although it would seem obvious, recognized excellence or quality in the hierarchical system directed by editors does not guarantee scientific quality and excellence¹¹.

Aiming to allure the scientific production of the Latin American region through mainstream magazines is an absolute mistake¹². Research about scientific production of developing countries reveals differences in relation to publication in central countries. This occurs for differing reasons: the workings of the

institutions; the way in which ideas circulate; the scientific hierarchies, including such factors as language, the scientific aim or the research material.

In any case, central countries recommend to peripheral countries that the investigations about the social structure of science in developing countries “should be done specifically in order to determine if the publication behavior and citation there is comparable to that of advanced countries. If it is not comparable, then bibliometric indicators may not be appropriate instruments to examine science in the Third World”¹³.

In addition to this, believing that the analysis of scientific production of developing countries is done by using central countries as reference can lead to comparisons that have no meaning whatsoever. The fact that quantitative data reflect little visibility does not mean that production of scientific literature does not exist in Latin American countries.

The quantitative data about Latin American publications indexed in the ISI base do not express quality, but rather quantity of the result of research carried out. This type of quantitative indicator is, therefore, an estimated measure of the scientific activity of a country¹⁴.

Even taking these aspects into consideration, a large part of the work of quantitative analysis of Latin American written production takes place with the SCI database serving as a parameter. This work evidences a great scientific gap that some Latin American countries venture to reduce unsuccessfully.

The Latin American presence in this database has been low, in relation to world production¹⁵. Latin American scientific production (in terms of number of articles published) was only 1% in 1978. Data from 1986 revealed that 42.6% of SCI publications corresponded to the USA and 3% to the Third World¹⁶. The 1% rose to 1.8% between 1986 and 1991, evidencing once again the gap between developed and developing countries. More recent data (see table 1) show that, although low indexes are maintained in relation to central countries, there is some growth in the Latin American contribution to ISI.

SCI gathers data from more than 800,000 articles annually, available in approximately 3500 international circulation periodical publications. The number of magazines varies from year to year: in 1992 there were 3241 which corresponded to 47 countries; 19 Iberian-American (7 Spanish, 3 Argentine, 3 Brazilian, 3 Mexican, 2 Chilean and 1 Venezuelan)¹⁷.

At the end of the decade of the 90s, 14 Latin American and Caribbean magazines were registered at SCI¹⁸. In other words, the 27 countries of Latin America generated only 1.4% of the 70,000 scientific magazines produced worldwide.

The interest in including Latin American magazines in SCI comes from the necessity to index them; it is believed that this condition will give the published works the possibility to transcend the local milieu and reach the international scientific community. There are various factors, however, which make it difficult to attain this objective. In addition to the criteria established by the selection of the base, factors such as the scientific “subproduction” of the countries of the region stand out.

Factors such as the predominance of an oral culture, unfamiliarity with the English language, belief in the lack of interest on the part of researchers from central countries in relation to research done in the periphery, the ephemeral life of local magazines, and pressures to publish are some of the most common in literature on the subject.

In order to explain the ephemeral existence of publications, some authors¹⁹ add problems of an administrative nature and of scientific quality to those regarding finance and language.

Other explanations for Latin American “subproduction” point out the existence of sclerotic hierarchical structures for research or the chaotic workings of scientific institutions after political changes, absence of economic resources, lack of trained personnel, lack of care of aspects of the marketing and distribution of publications, and quality and evaluation of publications²⁰.

Year	Latin America	World
1990	9,622	554,229
1995	14,499	665,590
2000	22,589	714,171

Source: Based on Leta; Brito-Cruz, 2003:136

Table 1. Latin American publications in scientific periodicals: ISI base (1981-2000)

This does not mean that magazines are not produced in the region, but rather that there are difficulties for their consolidation in the local circuit and, therefore, the visibility on the international level is very low. In these conditions the probability of scientific publications “perishing” is high, and a question arises that more than a few authors have already raised: does it make sense for countries with a lesser degree of scientific development to continue producing local scientific magazines that are not indexed?

Although it is indispensable that Latin American researchers publish their findings in mainstream literary magazines, the need to maintain magazines from the local region that acquire international visibility is also imposed. The publication of scientific magazines in Latin American countries, where there is a minimum scientific base, is imperative²¹. Science is an active component of culture, with broad international visibility, and that the best publications reveal scientific communities of quality and are the result of accumulated and systematic efforts²².

On the other hand, the existence²³ of the publications reveals the capacity of control of a complex and substantive process: the generation of knowledge and its public authentication. Consolidating international presence in bases like SCI therefore seems indispensable, not only because of a question of prestige but, probably, also because the editorial process itself to which publications are submitted permits the elevation of quality levels and the training of human resources of a high standard.

The controversy with regard to the use of bibliometric/scientometric measurements based on the studies of ISI, and the imperative to study the reality of Latin American scientific production based on models that better reflect the characteristics of scientific development in this context, recently added to interest on the subject of Latin American serial publications²⁴.

In the Latin American case the databases about scientific publications are very different from those of the ISI in terms of coverage and structure. Brazil, for example, created the SCIELO (Scientific Electronic Library Online) database in 1998. The model assures visibility and universal access to its scientific literature, contributing to the overcoming of the phenomenon known as ‘lost science.’ It operates in the publication of scientific publications on the internet and contains information that is not catalogued in other databases²⁵.

Countries such as Mexico, Colombia, or Venezuela also participate in the production of scientific magazines and seek to make them available, at the local level as well as at the international level.

These initiatives came about mainly during the 90s, a period in which theoretical discussions about the need to look beyond the quantitative model were delved into. The Venezuelan case, serves as an example of these concerns:

“As part of the evolution itself of the national scientific community, a greater consciousness of what is necessary to develop a perspective that is more ‘within’ science that is done in the country is noticeable. It is beginning to be seen that perhaps the most important thing is not to evaluate Venezuela’s impact on international science; on the contrary, it is to analyze and measure the progress that scientists have made, among other settings, in their national magazine *Acta Científica Venezolana (ACV)*”²⁶.

Thus the objective of internally mapping national research makes sense, identifying the important thematic nuclei and promoting dialogue among local research groups.

It is with a basis in this reflection that we focus our attention on the Bolivian case, about which a survey was carried out of the existing academic studies which constitute the main reference in literature on the subject of scientific periodical publications and the point of departure for analysis and reformulation of strategies and mechanisms of visibility of national scientific production.

Bolivian scientific publications

Considering that the references of the literature on the evolution of the distinct areas of knowledge in Bolivia²⁷ are scarce, it becomes even more difficult to obtain an historical approximation of the experiences of production/diffusion of national scientific magazines. Some pioneer studies in relation to the Bolivian publications, although insufficient at the moment of dealing specifically with the question of publications of a scientific nature, constitute the main references as regards the registering of this information, and they allow an approximation of the subject.

These are catalogues that register the bibliography of various areas of knowledge: “Catalogue of the Bolivian Bibliography” (1900-1963) by Arturo Costa de la Torre (1966), “Catalogue of Publications in the Medical Field” by Rolando Costa Arduz (1973), “Catalogue of National Periodical Publications”

(1986) and the "Catalogue of Periodical Publications of La Paz Libraries Specialized in Earth Sciences, Mining and Metallurgy" (without date) by Teresa Zelaya de Villegas; and finally, the "Catalogue of National Periodical Publications of Biomedical Sciences located in libraries of La Paz" (1980)²⁸ by Patricia Castillo and Magaly Vildoza. Studies were also identified which broached such topics as storage, access and circulation of the collections and the historical development of the publications. All of these were produced in the School of Library Sciences of UMSA (Greater University of San Andrés).

Two of these studies especially caught our attention for having the objective of registering publications of an academic nature that were edited in centers, laboratories and research institutes of Bolivian universities: the "Directory of Bolivian University Serial Publications"²⁹ and "Periodical Publications in the News Library of the UMSA Central Library: actual situation and perspectives"³⁰.

These studies show a significant number of national publications of diverse natures, in regards to format and content being referred to, mainly starting in 1970. The first of these identified 2,254 titles of publications; a large part published in the city of La Paz by universities, professional societies and schools, nongovernmental organizations (NGOs) and individuals from the most diverse areas of knowledge (Health, Culture, Human and Social Sciences, Engineering, Natural Science, Pure Science). In regard to the areas of knowledge of the publications, Social Sciences is predominant in both studies, followed by Health Sciences.

A later work (1999) entitled *Bolivian Periodical Publications on Culture, Research, Science and Technology of Bolivia (1990-1995)*³¹ identified 150 publications, although with a more restricted focus in relation to the selection of publications of a scientific nature, as the title suggests. However, the information is still insufficient for several reasons, mainly because it deals with a survey that registers diverse publications without presenting data on the origin or the present state, and without classification by area of knowledge, like, for example, the institution of origin or the nature of the publication, among others. However, it does allow for the confirmation of the existence of an expressive number of periodicals (magazines) that could be considered scientific.

One of the obstacles in understanding the Bolivian case from these studies is the absence of a definition of the scientific character of the publications. This calls our attention when we consider that gauging the degree and the scientific and technical value of publications is the objective of these studies. This imprecision makes the identification of scientific periodicals in the set of national publications through the identified studies even more difficult.

In addition to this, the studies point to the absence of their "efficient dissemination"³², which can be related to factors such as the lack of trained personnel, economic resources, insufficient circulation mechanisms and scientific communication strategies. Thus, the visibility of the Bolivian publications, in the local arena (access and use in libraries) as well as circulation in the external scientific community (through databases), is minimal.

The presence of Bolivia in international and regional databases is of little significance. Data from RICYT³³ allow us to confirm this through a register of databases in which some national publications appear (SCI SEARCH, PASCAL, INSPEC, COMPENDEX, CHEMICAL ABSTRACTS, BIOSIS MEDLINE, CAB, ICYT, and IME). Although numerical data is not very encouraging, it does not indicate an absence of Bolivian scientific literature.

Only as an example we mention that in the PASCAL base, the total number of publications in Andean countries between 1996 and 2000 is 668, 21 of which (3.1% of the total) are from Bolivia³⁴. In the LILACS register, data from June of 2003 show a total of 633 magazines, of which 15 are Bolivian. This number lowers to 10 magazines in September of 2004, out of a total of 649 magazines³⁵.

Finally, LATINDEX registers 12,787 magazines (until 2004), 19 of them being Bolivian³⁶. In the majority of the cases the data reflect an insufficient, when nonexistent, presence of Bolivian scientific production, probably because of the asymmetry which characterizes relationships with scientifically developed countries, and in addition to this, given the characteristics of the national scientific development and particularly because of the scarce attention and priority that scientific activities seem to have for the Bolivian state.

Until the first year of the new century, the institutional apparatus for science and technology in Bolivia was no more than a screen moved by the impulse of fads and external resources promoted by international entities. Under this influence, actions were developed that were of the present moment and isolated, without any concrete perspective of being guided through in order to form a national policy on

scientific and technological material. The elements that currently configure the institutional apparatus for scientific and technological policy in Bolivia do not result from an actual political will for science and technology³⁷.

There is truly a direct correlation between the situation of a country's scientific periodicals, its degree of scientific development, and the prestige that the State and even society itself confer upon scientific activity³⁸.

In the Bolivian case, the most recent plan of activities of the Vice-Ministry of Science and Technology points to the necessity of fomenting the popularization of science³⁹. This is an aim which is quite close to what would be the communication of science; however, it does not address the subject of national scientific publications.

Final considerations

Given that various Latin American scientific publications truly perish year after year, countries with a lesser degree of scientific development should not continue producing local scientific magazines that are not indexed. This is a simple and practical response from the point of view of the leaders of world science.

From the point of view of developing countries, the answer is that scientific magazines should continue to be produced, giving attention to location and without getting caught up in comparisons that inevitably lead to failure and the disappearance of publications from countries with a lesser degree of scientific development.

In the Bolivian case, alongside the handicaps identified in the information on Bolivian publications, there is an expressive quantity of national scientific publications (magazines), dispersed, that requires strategies in order to improve its visibility. But before this, the context of the national scientific production, about which still very little is known, should be known very well.

Perhaps it is thus worth starting with, as did Venezuela, looking within – in other words, analyzing and measuring the progress of national science through more representative national magazines, instead of continuing to evaluate and compare the local impact with the impact of international science.

The asymmetric relationship that characterizes the availability of scientific literature in the large international databases should not extinguish local initiatives that make the scientific production of developing countries visible. On the contrary, it seems necessary to reinforce internal (local) mechanisms in order to better project the results into the international context.

Scientometric analysis, when viewed from the perspective of Latin American publications, truly says little or nothing with regard to the knowledge produced, for example, in Bolivia (mainly in qualitative terms).

However, it should also be made clear that, although the bibliometric focus be a target of criticism and, why not admit, an instrument that shows and even deepens asymmetries with regard to the production of scientific literature and its use, when combined with qualitative methodologies in the analysis of Latin American experiences it allows one to know the situation of scientific production in a determined context.

The “micro” studies identified in Bolivia show what there is of Bolivian scientific production in some academic spaces. The identification and production of new studies will probably allow, in the future, an approximation of the national reality (“macro”) of scientific publications. Until then, making existing information visible (organizing and making available) in local databases should become a priority.

Translated by Robert Garner

Notes and references

¹ See Vessuri “*La Revista Científica Periférica. El Caso de Acta Científica Venezolana*”. In: INTERCIENCIA. 1987:12(3): p.124-34.

² Ibidem.

- ³ See Macias-Chapula, C. "O papel da informetria e da cientometria e sua perspectiva nacional e internacional". In Ci. Inf., Brasília, v.27, n.2.1998. p.134-140.
- ⁴ Ob.cit, p.134.
- ⁵ Ob.cit., p.135.
- ⁶ A brief chronology of bibliometric studies, from 1743 to 1980, can be found in Maia and Caregnato, "Estudos Bibliométricos na Comunicação Científica: Bibliotecas Digitais como Fator de Revitalização" Trabalho apresentado ao XIV.ENDOCOM – Encontro de Informação em Ciências da Comunicação - Porto Alegre, 2004. Available at: <http://www.portcom.intercom.org.br/portcom2/endocom2004/Maia.pdf>
- ⁷ See Leta; Brito-Cruz. "A produção científica brasileira" (cap 3) In: Indicadores de ciência, tecnologia e inovação no Brasil.. Eduardo B. Viotti e Mariano M. Macedo (Org) ed.Campinas : Editora da UNICAMP, 2003: p.157.
- ⁸ See Rusell, J; Gutierrez, A. "La inserción internacional de las revistas Mexicanas de mayor trascendencia en la investigación científica nacional". In: Cetto, A.M. y Alonso, O. (Comp). Revistas Científicas en América Latina. Mexico. ICSU, UNAM, CONACYT, FCE,1999: p.304.
- ⁹ Leta; Brito-Cruz, Ob.cit, p.131.
- ¹⁰ See Guerrero, R and Chica, C. "Revistas Científicas Latinoamericanas. A la búsqueda de un lugar en el sol". In: Cetto, A.M. y Alonso, O. (Comp). Revistas Científicas en América Latina. México. ICSU, UNAM, CONACYT, FCE,1999: p.274.
- ¹¹ See Martí, D. "Las Revistas Académicas Ibéricas y Latinoamericanas de Comunicación en Internet en el Contexto Tecnológico Actual" In: Revista Electrónica Razón y Palabra. N.41 October – November, 2004. México. www.cem.itesm.mx/dacs/publicaciones/logos/antiores/n41/dmarti.html - 73k.
- ¹² See Arvanitis, R. "La relación incierta. Ciencia aplicada y desarrollo en Venezuela". Caracas: Fondo Editorial Fintec, 1996: p.92-93.
- ¹³ See Frame "Problems in the Use of Literature based S&T indicators in Developing Countries" (1985). In H. Morita-Lou (ed), Science and Technology Indicators for Development. Boulder and London. Westview Press, p.117-122. "This recommendation is reinforced by Cano & Burke (without date) in "Publication Patterns in Mexican Science".University of Western Ontario. Canada. (Mimeo), according to whom it is necessary that the motivations for doing science be examined in order to publish within or outside of the country, the differences in preferred styles of scientific communication among the various areas of knowledge and that guided historical studies be done of the development of the scientific article as a form of communication in peripheral countries, before conclusions can be made about the productivity or quality of science in these countries" In Velho, S, L. "Como estabelecer um sistema de indicadores bibliométricos para américa latina: Proposta de Estudo" DPCT/IG/UNICAMP, 1999: p.2.
- ¹⁴ Leta; Brito Cruz, Ob.cit.
- ¹⁵ See Mclauchlan (1988) in Arvanitis, Ob.cit
- ¹⁶ See Fortes in Cetto, A.M. y Alonso, O. (Comp). "Revistas Científicas en América Latina". México. FCE, 1996.
- ¹⁷ See Ciência Hoy Electronic Magazine. <http://www.ciencia-hoy.retina.ar/hoy44/biblio4.htm>
- ¹⁸ See Bonilla and Angón. "Revistas Mexicanas de Investigación científica y tecnológica". In: Interciencia. Vol. 24 Nº 2, 1999, p.102-106.
- ¹⁹ See Ardila, R. "Scientific publishing in Latin América: the case of journals in the behavioral and social sciences". In: Cetto, A.M. y Alonso, O. (Comp). Revistas Científicas en América Latina. México. ICSU, UNAM, CONACYT, FCE,1999: p. 231-224.
- ²⁰ Arvanitis, Ob.cit, p.92
- ²¹ See Krauskopf , M. and Vera, M. "Las revistas latinoamericanas de corriente principal: indicadores y estrategias para su consolidación". In: Cetto, A.M. y Hillerud, K., eds. Publicaciones Científicas en América Latina. Mexico. FCE,1996.
- ²² Bonilla and Angón, Ob.cit.
- ²³ The reasons for the existence of Latin American scientific magazines has been broached by authors such as Cetto and Hillerud (1996); Esteba Mabaroto (1996); Cetto and Alonso Gamboa (1998); Gómez, et.al.(1998); Bonilla and Angón, (1999:102)
- ²⁴ Ricyt, Colciencias and OAS. Documento de conclusiones del II taller Iberoamericano sobre indicadores de ciencia y tecnología, Cartagena de Índias, 24-26 de abril, versión revisada, Quilmes, 22 de Junio.1996. In: Cetto, A. Revistas Científicas en América Latina. Mexico. ICSU, UNAM, CONACYT, FCE,1999.
- ²⁵ At http://www.scielo.org/model_pt.htm (Accessed on Nov. 17, 2005).
- ²⁶ As related by Vessuri, Ob.cit.p.124
- ²⁷ Condarco Morales mentions various references in this sense in his book "Historia del saber y la ciencia en Bolivia": "Historia de la Medicina" (Juan Manuel Balcázar), "Historia de la Educación en Bolivia" (Rafael Reyeros), "La Ciencia en Bolivia" (Mesa-Gisbert), corresponding to the colonial period. Academia Nacional de Ciências de Bolivia. La Paz. 1978.
- ²⁸ Source: Biblioteca Virtual UMSA. (Accessed on July 18, 2005).
- ²⁹ See Rivero, F. "Directório de Publicaciones Seriadadas Universitarias Bolivianas". Tese de grado. UMSA.1986.
- ³⁰ See Calle, L. "Las Publicaciones Periodicas na Hemeroteca da Biblioteca Central da "UMSA" Situación actual y Perspectivas". Tese de grado. UMSA. 1999.
- ³¹ Presented by Carvajal and Macías as an appendix in the Bolivian report on the Bolivian Scientific and Technological System, as part of the Iberian-American Guide of Public Administration of Science of the Organization of Iberian-American States (OEI). "Publicações Periódicas Bolivianas sobre Cultura, Pesquisa, Ciência". Available in <http://www.campus-oei.org/guiaciencia/index.html> 1999.
- ³² Rivero, Ob.cit.
- ³³ See RICYT- Red de Indicadores de Ciência y Tecnología. Available in: <http://www.ricyt.edu.ar/indicadores/porpais/BO.xls> (Accessed in Nov., 2004)
- ³⁴ See Polanco, X; Besagni, D. "Datos bibliométricos sobre los Países de la Comunidad Andina en la base de datos multidisciplinaria PASCAL del INIST-CNRS.Ponencia Taller Andino de Indicadores de Ciencia, Tecnología e Innovación".

CAN, República de Francia, COLCIENCIAS, OcyT, RICYT, PUJ, 19-20 de Junio de 2001, Bogotá, Colombia. 2001. Available in: <http://www.campus-oei.org/salactsi/polanco3.htm>. acesso em 11-09-03 (Accessed on Sept. 11, 2003).

³⁵ Source: http://www.bireme.br/abd/E/elista_pais.htm (Accessed in Aug., 2004).

³⁶ Source: Latindex. www.latindex.unam.mx (Accessed on May 13, 2004).

³⁷ See Pabón, C; Velho, L. “*Institucionalização da política científica e tecnológica na Bolívia: avanços e retrocessos*”, Silvia Cristina Pabon Escobar. Dissertação de (Mestrado em Política Científica e Tecnológica) Instituto de Geociências. Universidade Estadual de Campinas, Campinas, 2002.

³⁸ See Corrêa da Costa, A. “*Periódico científico brasileiro – o “ato heróico” de sua publicação: revisão da literatura para a área biomédica*”. In: Revista Ciência e Cultura, SBPC, 41 (12): 1160-1178), December, 1989: p.1161.

³⁹ Interview with Patrícia Escobar, CONACYT Diretor Bolivia, 2004.

Authors

Since April 2006 Cristina Pabón Escóbar has been working for the Bolivian Deputy Ministry of Science and Technology as coordinator of scientific and technological Communication and Information. She is currently a PhD candidate in the Graduate Program in Scientific Policy and Technology. She concluded her Master degree in 2002. In 2003-2004 she specialized in Scientific Journalism with a degree in Science of Social Communication at Universidade Católica in Bolivia. E-mail: escobar@ige.unicamp.br.

Maria Conceicao da Costa is Chief of the Department of Scientific and Technological Policy at the Institute of Geosciences, State University of Campinas. She works in the following areas: Dynamics of Scientific knowledge, International Cooperation in Science, Technology, Analysis of Science and Technology Policies, Science and Gender Relation. She has a Phd in Scientific and Technological Policy and a Master degree in Political Science. She specialized in Public Policy and graduated in Social Sciences.. E-mail: dacosta@ige.unicamp.br.