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Scientific journals in the SciELO database, indicators of impact and the relative position of Ambiente & Água

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ABSTRACT

This editorial describes the process of periodic evaluation by CAPES, based on commercial indices proposed by companies such as the ISI FI by Thomson Reuters and SCImago by Scopus and public indices as proposed by SciELO and other freely calculated indices based on Google Scholar and investigates the impact position of the journal Ambiente & Agua compared with journals from the SciELO base. Results show that Ambiente & Agua is in the right path in the search for quality. Its editorial board strongly recommends that Brazilian public scientific agencies consider tools that are cost free and have large coverage for impact evaluation to allow the impact assessment of a range of emerging journals in a common and wide basis for all scientific journals.

Keywords: Indexation; h-Index; Impact Factor.

1. INTRODUCTION

SciELO Project (Scientific Electronic Library Online) was established due to the need to understanding the scientific production in Brazil and other countries in Latin America and the Caribbean at the time not yet indexed by the main international database, ISI Web of Knowledge. The project resulted from a collaboration between the Foundation for Research Support of São Paulo (FAPESP) and the Latin American and Caribbean Center on Health Sciences (BIREME) with the support of CNPq (National Council for Scientific and Technology Development). According to Meneghini (1998) between 1981 and 1993 the number of Brazilian articles indexed by the ISI has grown by 60%, but this represented only 20% to 25% of the national scientific production, which had been growing in the range of 65% between 1987 and 1998. This scenario, according to the author, made clear the following concern: "we can not know the quality of this production and the impact of its circulation". Today SciELO has very clear criteria for inclusion, maintenance, and evaluation of scientific journals. These criteria seek "the visibility, accessibility, and credibility of scientific publications in Latin America and the Caribbean, using an Internet integrated publication of collections of national and regional journals. In the long term the project seeks to contribute to increasing the impact of scientific production in these regions" (SciELO, 2004).

The position of impact indicators of the journal Ambiente & Agua, in relation to other Brazilian journals that publish articles on related areas, ranked by Qualis /CAPES in strata A2, B1, B2 and B3, was discussed by Batista and Dias (2010). Results showed that Ambiente & Agua showed impact values measured by h-index, g-index, and AW-index higher than other Brazilian scientific journals classified in higher Qualis / CAPES strata, not only B2 and B1, but also A2.

In this paper, the objective was to analyze the impact of all journals registered in the SciELO database and compare with the same indicators of Ambiente & Agua without applying any restriction period, therefore, taking into account the entire history of each journal.

2. MATERIAL AND METHODS

To develop this paper, the values of the h-index, g-index, AW-index, e-hm-index and index were calculated. These indices are defined as follows:

• h-index was defined by Hirsch (2005) "*a scientist has index h if h of his/her Np papers have at least h citations each, and the other (Np-h) papers have no more than h citations each*";

• g-index was defined by Egghead (2006) as "*[Given a set of articles] ranked in decreasing order of the number of citations that they received, the g-index is the (unique) largest number such that the top g articles received (together) at least* g^2 *citations";*

• AW-index of Jin (2007) corresponds to the square root of AWCR. The latter is based on a weighted age factor and measures a bundle of articles adjusted for the age of their publication;

• e-index was defined by Zhang (2009) as a complement to the h-index that takes into account the ignored excess citations;

• hm-index was defined by Schreiber (2008) as a modification of the h-index to solve the problem of determining the impact of co-authored articles using a fractionalized counting of the published papers.

All values of the five indicators were obtained using the Harzing's Publish or Perish version 3.1.3974 obtained on November 17th, 2010. For journals with similar names, a SciELO filter was used to return only the specific values for the effective desired journal.

The values were tabulated in spreadsheets and analyzed using XY scatter plots. Subsequently, the values of the five indicators for each of the 218 journals were organized in matrices for cluster analysis, so that each journal occupied the same position in each array. This matrix structure was subjected to cluster analysis using MultiSpec version 3.1. For this analysis Isodata algorithm was chosen with initialization along first eigenvector of the covariance matrix. The Isodata algorithm was proposed by Ball and Hall (1965) in their work dedicated to the development of mathematical algorithms for clustering (generation of clusters) in accordance with other studies in the field of pattern recognition in a multivariate data matrix. According to the authors, Isodata "is an interative procedure for the sorting of a set of multi-dimensional patterns into subsets of patterns. An average pattern is used to represent each subset of patterns, and the iterative process, by changing the composition of these subsets, creates new average patterns [...] the procedure compare patterns with a set of clusters constructed from subsets of the patterns themselves, and groups patterns together on the basis of these comparisons". Comparisons are made of measures of distance in three dimensional space and groups are formed by the proximity between them.

The cluster analysis was performed by limiting the maximum number of groups initially in four and later in eight. The groups formed by the process of generating clusters have statistical values that describe them as a group, that is, the number of members, the average value for the group, and the standard deviation among group members.

3. RESULTS AND DISCUSSION

The results of the analysis of the impact values of the five indicators of the 218 journals from the SciELO database (listed in Table 1), as well as of Ambiente & Agua, are shown in XY scatter plots presented in Figures 1 and 2. In both figures the X axis was maintained (AW-index values) and the Y axis contains the values of other indicators. Figure 1 shows that most journals have values lower than 30 for the h-index and AW-index and lower than 40 for the g-index. Very few journals (six) have values greater than 40 for the first two indicators and 60 for the g-index. This relative distribution between the values of these three indicators anticipate a probable formation of clusters (groups) over the point cloud that can be seen in this figure, that is, denser groups of journals impact values (with lower variance) near the axes intersection and more scattered journal groups (with higher variance) toward the higher impact indicator values.

Table 1. List of scientific journals of the SciELO database analyzed in this article.

ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo)	Paidéia (Ribeirão Preto)
Acta Amazonica	Papéis Avulsos de Zoologia (São Paulo)
Acta Botanica Brasilica	Perspectivas em Ciência da Informação
Acta Cirurgica Brasileira	Pesquisa Agropecuária Brasileira
Acta Ortopédica Brasileira	Pesquisa Operacional
Acta Paulista de Enfermagem	Pesquisa Veterinária Brasileira
Ágora: Estudos em Teoria Psicanalítica	Physis: Revista de Saúde Coletiva
Alea : Estudos Neolatinos	Planta Daninha
Ambiente & sociedade	Polímeros - Ciência e Tecnologia
Anais Brasileiros de Dermatologia	Pró-Fono Revista de Atualização Científica
Anais da Academia Brasileira de Ciências	Pro-Posições
Anais do Museu Paulista: História e Cultura Material	Produção
Arquivo Brasileiro de Medicina Veterinária e Zootecnia	Psico - USF (Impresso)
Arquivos Brasileiros de Cardiologia	Psicologia & Sociedade
Arquivos Brasileiros de Endocrinologia & Metabologia	Psicologia Clínica
Arquivos Brasileiros de Oftalmologia	Psicologia em Estudo
Arquivos de Gastroenterologia	Psicologia Escolar e Educacional (Impresso)
Arquivos de Neuro-Psiquiatria	Psicologia USP
ARS (São Paulo)	Psicologia: Reflexão e Crítica
Avaliação: Revista da Avaliação da Educação Superior (Campinas)	Psicologia: Teoria e Pesquisa
	Química Nova
BAR. Brazilian Administration Review	Radiologia Brasileira
Biota Neotropica	RAE eletrônica
Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas	RAM. Revista de Administração Mackenzie (Online)
Bragantia	Religião & Sociedade
Brazilian Archives of Biology and Technology	Rem: Revista Escola de Minas
Brazilian Dental Journal	Revista Árvore
Brazilian Journal of Biology	Revista Brasileira de Anestesiologia
Brazilian Journal of Chemical Engineering	Revista Brasileira de Botânica
Brazilian Journal of Infectious Diseases	Revista Brasileira de Ciência Avícola
Brazilian Journal of Medical and Biological Research	Revista Brasileira de Ciência do Solo
Brazilian Journal of Microbiology	Revista Brasileira de Ciências Sociais
Brazilian Journal of Oceanography	Revista Brasileira de Cirurgia Cardiovascular
Brazilian Journal of Otorhinolaryngology (Impresso)	Revista Brasileira de Coloproctologia
Brazilian Journal of Pharmaceutical Sciences	Revista Brasileira de Economia
Brazilian Journal of Physics	Revista Brasileira de Educação
Brazilian Journal of Plant Physiology	Revista Brasileira de Educação Especial
Brazilian Oral Research	Revista Brasileira de Educação Médica
Caderno CRH	Revista Brasileira de Enfermagem
Cadernos CEDES	Revista Brasileira de Engenharia Agrícola e Ambiental
Cadernos de Pesquisa	Revista Brasileira de Ensino de Física
Cadernos de Saúde Pública	Revista Brasileira de Entomologia
Cadernos EBAPE.BR	Revista Brasileira de Epidemiologia
Cadernos Pagu	Revista Brasileira de Estudos de População
Cerâmica	Revista Brasileira de Farmacognosia
Ciência & Educação (Bauru)	Revista Brasileira de Fisioterapia

Ciência & Saúde Coletiva	Revista Brasileira de Fruticultura
Ciência da Informação	Revista Brasileira de Geofísica
Ciência e Agrotecnologia	Revista Brasileira de Ginecologia e Obstetrícia
Ciência e Tecnologia de Alimentos	Revista Brasileira de Hematologia e Hemoterapia
Ciência Rural	Revista Brasileira de História
Clinics	Revista Brasileira de Medicina do Esporte
Coluna/Columna	Revista Brasileira de Meteorologia
Computational & Applied Mathematics	Revista Brasileira de Oftalmologia
Contexto Internacional	Revista Brasileira de Ortopedia
Dados - Revista de Ciências Sociais	Revista Brasileira de Parasitologia Veterinária (Online)
DELTA: Documentação de Estudos em Lingüística Teórica e Aplicada	Revista Brasileira de Plantas Medicinais
	Revista Brasileira de Política Internacional
Dental Press Journal of Orthodontics	Revista Brasileira de Psiquiatria
Eclética Química	Revista Brasileira de Reumatologia
Economia Aplicada	Revista Brasileira de Saúde Materno Infantil
Economia e Sociedade	Revista Brasileira de Sementes
Educação & Sociedade	Revista Brasileira de Terapia Intensiva
Educação e Pesquisa	Revista Brasileira de Zootecnia
Educação em Revista	Revista CEFAC
Educar em Revista	Revista Ciência Agronômica
Engenharia Agrícola	Revista Contabilidade & Finanças
Engenharia Sanitaria e Ambiental	Revista da Associação Médica Brasileira
Ensaio: Avaliação e Políticas Públicas em Educação	Revista da Escola de Enfermagem da USP
Escola Anna Nery	Revista da Sociedade Brasileira de Fonoaudiologia
Estudos Avançados	Revista da Sociedade Brasileira de Medicina Tropical
Estudos de Psicologia (Campinas)	Revista de Administração Contemporânea
Estudos de Psicologia (Natal)	Revista de Administração de Empresas
Estudos Econômicos (São Paulo)	Revista de Administração Pública
Estudos Históricos (Rio de Janeiro)	Revista de Economia Contemporânea
Fisioterapia em Movimento (Impresso)	Revista de Economia e Sociologia Rural
Fractal : Revista de Psicologia	Revista de Economia Política
Genetics and Molecular Biology	Revista de Nutrição
Gestão & Produção	Revista de Psiquiatria Clínica
História (São Paulo)	Revista de Psiquiatria do Rio Grande do Sul
História, Ciências, Saúde - Manguinhos	Revista de Saúde Pública
Horizontes Antropológicos	Revista de Sociologia e Política
Horticultura Brasileira	Revista Direito GV
Iheringia. Série Zoologia	Revista do Colégio Brasileiro de Cirurgiões
Interações (Campo Grande)	Revista do Instituto de Medicina Tropical de São Paulo
Interface - Comunicação, Saúde, Educação	Revista Estudos Feministas
International braz j urol	Revista Gaúcha de Enfermagem (Online)
Jornal Brasileiro de Nefrologia	Revista Katálysis
Jornal Brasileiro de Patologia e Medicina Laboratorial	Revista Latino-Americana de Enfermagem
Jornal Brasileiro de Pneumologia	Revista Latinoamericana de Psicopatologia Fundamental
Jornal Brasileiro de Psiquiatria	Revista Paulista de Pediatria
Jornal de Pediatria	Sao Paulo Medical Journal
Jornal Vascular Brasileiro	Saúde e Sociedade
Journal of Applied Oral Science	Sba: Controle & Automação Sociedade Brasileira de Automatica
Journal of Epilepsy and Clinical Neurophysiology	
Journal of the Brazilian Chemical Society	Scientia Agricola
Journal of the Brazilian Computer Society	Scientiae Studia
Journal of the Brazilian Society of Mechanical Sciences and Engineering	Sociedade & Natureza (Online)
	Sociedade e Estado
Journal of Venomous Animals and Toxins including Tropical Diseases	Sociologias
	Soldagem & Inspeção (Impresso)
Kriterion: Revista de Filosofia	Summa Phytopathologica
Lua Nova: Revista de Cultura e Política	Sur. Revista Internacional de Direitos Humanos
Mana - Estudos de Antropologia Social	Tempo
Matéria (Rio de Janeiro)	Tempo Social
Materials Research	Texto & Contexto - Enfermagem
Memórias do Instituto Oswaldo Cruz	Trabalhos em Linguística Aplicada
Neotropical Entomology	Trans/Form/Ação - Revista de Filosofia
Neotropical Ichthyology	Tropical Plant Pathology
Nova Economia	Varia Historia
Novos Estudos - CEBRAP	Zoologia (Curitiba, Impresso)
Opinião Pública	

In Figure 2, the distribution pattern of the indicator values AW-index, e-index, and hm-index is similar to Figure 1. However, it can be seen from this figure that the dispersion is apparently a bit higher among journals with values greater than 20. In fact, the scale of the y-axis values on the left (e-index) has a lower range than the same axis in Figure what gives the initial impression of a greater dispersion. Just as in Figure 1, it is possible to anticipate the formation of denser clusters (near the intersection of axes) and less dense ones (for the higher values).

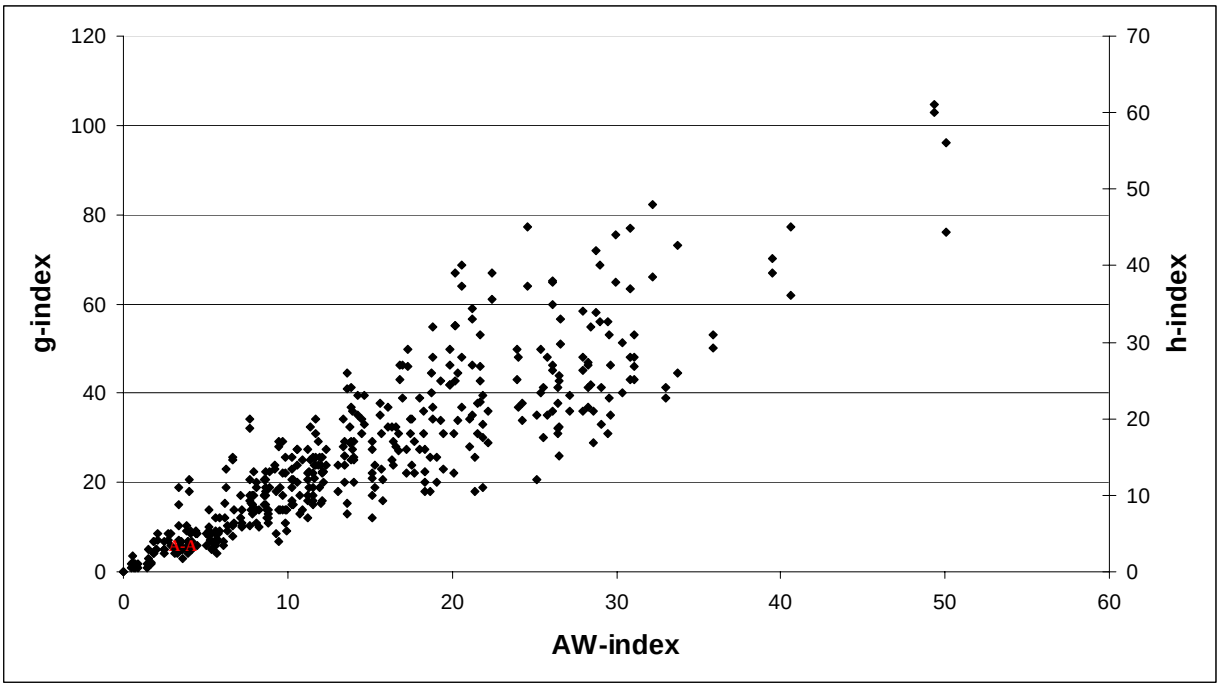

Figure 1. XY scatter plot for AW-index, g-index, and h-index indicator values of 218 journals from SciELO database and the journal Ambiente & Agua (AA).

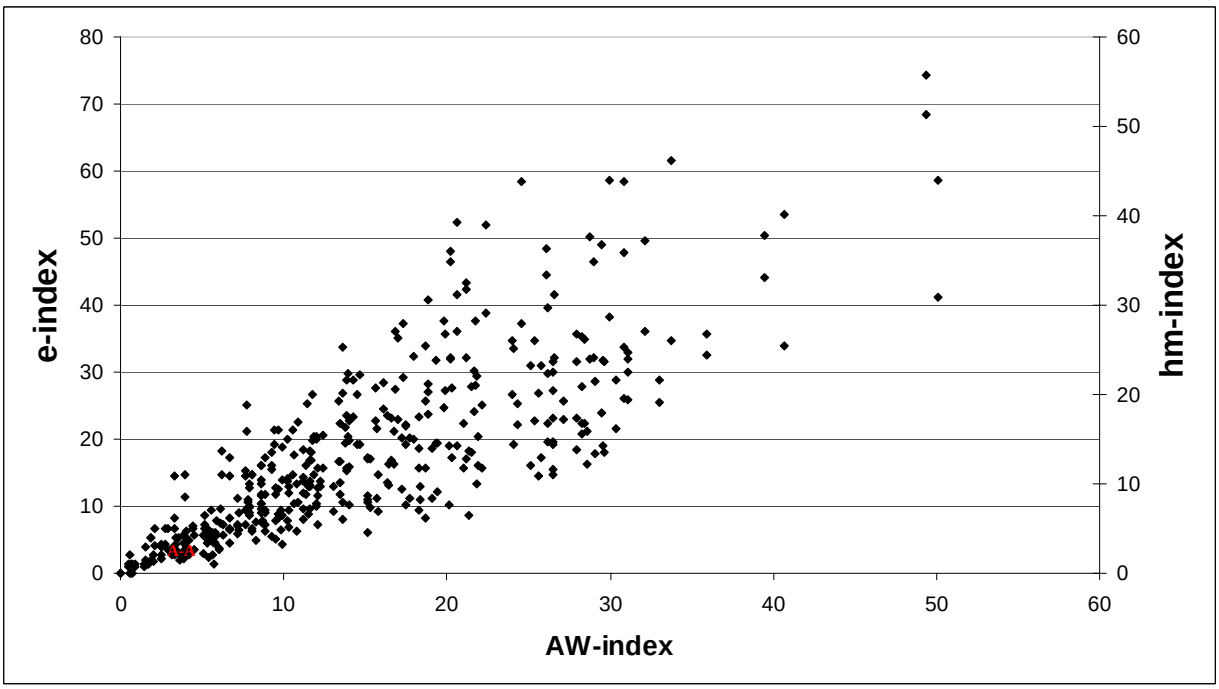

Figure 2. XY scatter plot for AW-index, e-index, and hm-index indicator values of 218 journals from SciELO database and the journal Ambiente & Agua (AA).

Ambiente & Agua journal presented the following values for each indicator: h-index = 5, g-index = 7; AW-index = 5.77, e-index = 5.58, and hm-index = 4.5. Despite the fact that Ambiente & Agua is not included in the SciELO database, its impact indicator values are higher than many other journals that are included in this database.

The cluster analysis results limited to four groups are presented in Table 2. The table shows the groups numbered from 1 to 4, the membership of each group (or the number of journals that were included in each group), percentage of members of each group compared with the total, and the mean and standard deviation for each group for each of the indicators. The group with the largest number of journals is Group 3 (81) that corresponds to 36% of the total. The g-index values are consistently higher than others in terms of average values, but not necessarily in terms of standard deviation. For example, Group 2 shows the highest standard deviation for the e-index compared to AW-index. And the values of h-index, g-index and hm-index show that they are much more similar. In this analysis, the journal Ambiente & Agua is included in Group 4 along with 66 other journals. However, it is important to point out that the impact values of all indicators of this journal are higher than the average of this group.

Table 2. Result of cluster analysis (cluster) limt the four groups of five indicators of the impact of 218 journals in the SciELO database on the Environment and Water journal.

Groups	Membership	Percentage	Mean				
			h-index	g-index	AW-index	e-index	hm-index
1	16	7,1	42,1	66,9	31,2	42,7	38,7
2	61	27,1	25,1	38,4	23,0	24,0	22,2
3	81	36,0	14,0	20,4	12,4	12,3	12,3
4	67	29,8	4,4	6,1	4,2	3,8	3,8
			Standard deviation				
1			8,2	11,6	9,5	11,0	6,4
2			5,0	6,3	5,7	6,7	4,5
3			3,5	4,4	4,2	3,6	3,3
4			2,6	3,9	2,8	2,7	2,2

Table 3 shows the results of the cluster analysis limited to eight clusters. This analysis provides a wider cut in the universe of impact values and a more harmonious relationship between members of each group that is reflected in the percentage values closer to a Gaussian distribution. As in the previous analysis, the g-index values were consistently higher, while the others show more similar values. Notably, Group 1 (with only two members) has the largest standard deviation mainly for *g* and *e* indices, but on the contrary, shows lower standard deviations for the indices *h* and *AW*.

In this analysis the journal Ambiente & Agua was ranked on group number 7. Therefore, Ambiente & Agua is at the forefront of at least 31 journals in terms of the values of the five impact indicators analyzed, which are registered in the SciELO database classified in Group 8. Furthermore, Ambiente & Agua is also at the forefront of some of the other 33 journals classified in its same group, because its impact values are near to the average impact values of that group.

Conclusions of the General Assembly of the XII Brazilian National Meeting of Science Editors, held in Aguas de Lindoia, São Paulo, Brazil, between November 23 and 27, 2009, indicated that for the Qualis classification of journals, other scientometry indices, additionally to ISI-IF (JCR), such as SciELO criteria and the impact factors of other databases (e.g. SCImago by Scopus), and other bibliometric indicators, should be included and, moreover, it was encouraged the creation of national databases. They also concluded that one should not

condition the evaluation of publications to indices only, other factors such as the editorial and advisory board membership composition, executive team, journal content, exogeny, originality of articles, blind peer review, publication standards, scope, mission, format, and layout must be considered. In the Sixth Workshop on Scientific Editing "Valuing and Qualifying Brazilian Publishers", held in São Pedro, SP, from November 28 to December 2, 2010, there was a clear consensus that CAPES should also include other indices besides JCR of Thomson Reuters, in particular the impact factor adopted by SciELO in their Qualis evaluation criteria. The editor of the Journal of Ambiente & Agua attended both events.

Table 3. Results of cluster analysis limited to eight groups of the five impact indicators of 218 journals from SciELO database and Ambiente & Agua journal.

Groups	Membership	Percentage	Mean				
			h-index	g-index	AW-index	e-index	hm-index
1	2	0,9	58,5	89,5	49,7	54,7	49,8
2	14	6,2	39,8	63,7	28,5	40,9	37,2
3	25	11,1	28,6	44,6	25,3	28,4	25,4
4	39	17,3	22,4	33,7	21,1	20,7	19,8
5	46	20,4	15,8	22,8	13,8	13,7	14,0
6	35	15,6	10,5	15,8	9,6	9,9	9,2
7	33	14,7	6,3	8,7	5,8	5,3	5,3
8	31	13,8	2,2	2,7	2,0	1,5	2,0
			Standard deviation				
1			3,5	19,1	0,5	19,3	8,3
2			5,5	6,1	6,6	9,2	4,5
3			3,8	4,6	5,8	7,0	3,4
4			4,1	3,2	5,5	4,7	3,8
5			2,5	2,8	3,6	3,3	2,6
6			2,3	2,0	2,6	2,3	2,2
7			1,6	2,0	2,0	1,4	1,2
8			1,6	2,1	1,7	1,2	1,5

The probability of estimating the ISI impact factor, based on the rate of Scopus, by the SCImago (citation/doc) with an error less than 5% is over 99% (Rocha e Silva, 2010). The almost perfect correlation between the cites/doc and the impact factor was observed in the analysis of Brazilian journals present in both databases. By considering the SCImago instead of ISI IF, it leads to including more than 3,300 journals that are indexed by SCImago, but not by ISI IF Thomson and Reuters. Although the inclusion of SCImago evaluation by CAPES could be considered an advance on CAPES criteria, it is, in fact, a timid step since SCImago is also a commercial base. Ideally, impact factors that take into account all journals in equal basis for comparison and are free, without commercial ties should be used instead. In this line, Hirsh and Wal (2007) made a comparison between Hirsch's h-index and ISI Journal Impact that considered more than 800 journals. They concluded that the h-index is more robust and less sensitive to time for measuring impact of these journals and also allows for greater coverage of events, considering the citations in books and records, and on several other journals not indexed by ISI. In fact, taking into account the full range of over 800 journals and separate subsets in specific subject areas within the area of Economics and Business, the correlation coefficients were always above 0.7. They attributed the discrepancy between the ISI IF and h-index to the limitations in the way the ISI is calculated, due to the limited coverage of the ISI citation database.

A comparative analysis of the SciELO Project impact factor values produced by the journals and the values of h-index and g-index will require a deeper analysis on how this

impact factor is calculated as well as other indices presented in this paper. This will be addressed in an upcoming issue of the Ambiente & Agua journal.

4. FINAL REMARKS

Currently, Brazilian supporting agencies for the development of new scientific journals preclude those journals that are not yet indexed by ISI and SciELO. For example, the Request for Proposals (RFP) MCT/CNPq/MEC/CAPES No. 68/2010 aims to support and encourage the publication and editing of scientific journals. At its II.2.2.1 item, among other restrictions limits the submission of proposals to journals that do not meet ... "journal should: ... item b) at least be indexed in the SciELO database and/or be classified in the Qualis/CAPES B2 as a minimum strata in the field or subfield of knowledge requested. The journal must be indexed in databases recognized by a relevant scientific and technological community, such as the ISI (Thomson Co) and Scopus (Elsevier)." Therefore, an emergent journal that has a significant impact but does not meet the above criteria can not compete for funding in this RFP. In the other hand, these are the journals that need more support to improve their scientific competence.

The results of the analysis with several indices compared with the impact factor registered in the SciELO database showed the prominent position of Ambiente & Agua in relation to some of the 218 journals analyzed. This indicates that this journal is in the right path toward pursuing quality of its publications without impinging unethical rules for those authors who submit their articles for review and publication and by giving priority to an information structure that protects the authenticity of the articles published.

The Editorial Board of Ambiente & Agua confirms its position in favor of using impact measuring indicators that are open, transparent, simple, and free for the evaluation of scientific publications.

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