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Water Resource Management: Bibliometric Study Using Web of Science (WoS) from 2010 to 2021

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ABSTRACT

The article aims to analyze the international scientific production on the management of water resources from the perspective of social and natural sciences, aiming to understand the characteristics of scientific publications. The methodology used was exploratory-descriptive, the procedure consisted of an analysis of articles related to the themes of water resource management, in the social and natural sciences, from the Web of Science database covering the period from 2010 to 2021, the search was carried out from the keywords used "water resources" or "governance - governance" or "stakeholders - stockholders" the choice of these terms was due to their approximation with the management of water resources, for filtration two steps were performed. In the first, we chose to keep as types of documents only scientific articles in the English language and, in the second, we proceeded to include research areas within the scope of the theme under study, totaling, in the end, 552 articles. The next step consists of evaluation related to research areas, journals, countries, references with a higher number of citations, and more relevant studies of factor H (H-index). The use of VosViewer software enabled the organization of groups (clusters) based on co-citation and the networks of co-occurrences of keywords, in a qualitative perspective. The most prominent terms revolve around the keywords water resource management, governance, and interest groups, the co-authorship cluster, the results point to numerous formations of clusters of authors (125), although it is noticeable the dispersion in the networks due to divergences in the responsibility of water resource management, presenting the main results for environmental sciences with 341 records (62.775%) of the total research, Water Resources with 331 records (59,964%); Civil Engineering with 169 records (30,616%); Environmental Engineering with 111 records (20.109%) and Multidisciplinary Geoscience with 93 records and (16.848%) of the total research.

INTRODUCTION

The management of water resources is currently a rising theme, based on the characteristics of water use and this as an economic good given its scarcity; according to ANA – Agência Nacional das Águas (2021), in the world it is estimated that 97.5% of the water that exists is salty, therefore unfit for direct use in irrigations of plantations for human consumption, etc. of 2.5% freshwater, most of which is about 69%, it is difficult to access because it is concentrated in glaciers, 30% are groundwater, stored in aquifers and 1% is found in rivers, under these conditions the use of such good must be accurate, though not to miss the various uses of life in society.

Having water as a scarce good and, therefore, an economic good, the management of these resources requires a legal device that normalizes its use in the most varied senses, thus, the Brazilian State has the National Water Resources Policy (PNRH), defining in Law No. 9,433 of 1997, the so-called Water Law. The PNRH, structured, guided, and modernized the management of water resources in Brazil, the Law also establishes in Article 4 that the Union articulates with the States in view of the management of water resources of common interest, ANA (2021).

In this sense, the research problem emerges as the investigation of understanding the relationship between governance, population, and management of water resources, identified from scientific production in the period from 2010 to 2021, so that there is no specific geographical delimitation since the research dealt with the identification from international production with data from the main database of the web of science. Chen, *et.al.*(2009) is a database that provides an overview of international production for water resource management.

The research is relevant, that the understanding and evaluation of water resources is fundamental for the maintenance of this resource, and this value becomes especially valid when planning and management projects are elaborated by interest groups, which, when understanding the processes of the scarcity of these resources seek plausible solutions in the context of governance and management as a whole Wang *et.al.*(2016).

The various problems related to water scarcity in qualitative and quantitative conditions bring to the fore concerns with the management of water resources throughout the population, a factor that led leads the authorities and the general population to develop various policies with the

objective of assisting in decision-making in order to ensure future generations and the current one, access to these resources, Mioto, (2014).

The determination of different parameters of a hydrographic basin brings information that assists in the management Campos*et.al.*(2015), information, that is fundamental in future environmental projects or planning, in this sense, geographic information systems have been used as a tool for generating information that correlates several environmental variables, Pereira, *et.al.*(2015).

At the present moment experienced throughout the planet, the concept of risk society of the German Ulrich Beck, (2011) is clearly drawn on the issue of environmental issues. Observing the work of the German sociologist and the consequences of the management of the water resources presented, we perceive four pillars of his thought that we can perceive in the situation witnessed: (a) all people, from different social classes, but with different intensities, are affected by the consequences of the so-called global risks; (b) the distribution and intensity of risks varies according to the characteristics of the social structure; (c) the risk factor is linked to misuse of natural resources, the environmental crisis; and (d) scientific and technological innovation can potentiate risks on a global scale, rather than reducing them Pessoa and Teixeira, (2020), in this sense Zhang *et.al.*(2018), develops studies that demonstrate the risks that the most vulnerable are exposed to when the results of the actions of the population as a whole reaches water resources, since even in question of prices are the most vulnerable who pay the largest, this is put by the characteristic of capturing and storing water.

In this context, the main objective of this study is to analyze the international scientific production on the management of water resources in the context of the areas of Social and Natural Sciences.

This research is structured from this introduction, in a section of theoretical foundation on the management of water resources, followed by a third section for methodology, following the fourth section brings the analysis and discussion of the results, to finally present the final considerations of the study, including the limitations and indications of future studies.

THEORETICAL FOUNDATION

Water is a scarce commodity, and therefore, it is an economic asset that to be managed efficiently requires knowledge of its chemical-physical characteristics, management, and environmental services that this general resource to the environment, knowing these characteristics, decision-makers will have conditions to manage watersheds with greater probability to the right depending on the quality of planning and the role that institutions assume in the elaboration process and planning execution, Zhang *et.al.*(2018).

This planning becomes necessary based on the assumption that given its particularities and the nature of the most varied sources of water resources, whether saltwater or sweet water, whatever its actions planning and projects should be elaborated and executed considering the percentages of each type of water available on the planet for human and animal use that according to ANA – National Water Agency (2021); 97.5% of all available water is in the oceans and therefore saltwater, and of the 2.5% of freshwater about 69% is difficult to access since it is concentrated in glaciers, 30% are groundwater and 1% are in rivers; the data cited justify the efficient management of water resources involving people, institutions and government in the process.

For the management of water resources to function masterfully, planning is necessary for all issues that refer directly and indirectly to the plans involving the gonzeli and goldenstein basins(1994). Considering that institutions play a fundamental role in this process of water resource management, management is the crucial point in solving the problem of the concept itself qualitatively, Chen *et.al.*(2009).

Managing water resources is the central point of solving the existing problem in the concept itself, in a qualitative way, lecturing the purpose of the resources collected, directing to public policy programs where they should be used, demonstrating to the stakeholders of the institutions the possible results to be achieved from the planning, the quality statement can be even demonstrated from charts and tables, Tucci (2005).

The important thing is to realize that the institutions concerned and decision-makers are able to jointly realize that managing water resources is in addition to the preparation of planning and projects and that the financial resources allocated for this purpose should be managed as efficiently as possible considering the physical and chemical characteristics of the resources

themselves and the geographical conditions of their surroundings, as well as the partner and economic aspects of the riverside, which needs to be inserted in the management process itself, becoming interested parties, so that the management is of quality.

The management of water resources is not limited to an approach of planning and elaboration of projects, in the search for quality management of these resources, but also and mainly a value to be charged for these services, so that it can be used for effective social development so that water governance has the purpose of implementing projects that can improve its use, so that users can have the opportunity to participate, likewise with managers, creating a sense of belonging among stakeholders, Tundosi (2008).

Water resources are well managed if stakeholders participate in the process, the concept is valid for all resources of this nature, and, therefore, these are covered for the seas and oceans and their particularities, rivers, streams, lakes, and reservoirs and their particularities; so that participatory approaches are seen as a way to achieve sustainable use of water resources, including local communities living within protected areas, Katikiro, (2020).

The stakeholders[1] are directly linked to the management process when for various reasons they participate in the process of constitution of planning and implementation projects, so when it comes to water resources institutions and government people are seen as the main instruments of policies to seek the socio-ecological aspects of conservations of aquatic biodiversity and sustainable development Katikiro, (2020), this is based on the need to discuss the issues of the current environmental crisis that brings within it the discussion on water management.

The environmental crisis brings the discussion to water, which is an indispensable resource for life and, especially, that of human beings, so that, given its importance, water is at the focus of the clash between the capitalist production model Mézáros (2002) and its finite conditions. The management models are based on neoliberalism by influencing world capitalism, promoting the reduction of state participation in the decision-making process, putting at risk in a considered way the process of water management, since the transfer of public assets and services to the private sector, especially transnational ones brings consequences and emerging challenges to

resource-holding countries that are attractive to capital, taking into account the process of privatization of water resources, Castro, (2007).

Water is a resource that has long held these challenges and its privatization process, especially in Latin America is a Castro reality, (2007), which makes it a little more difficult to manage a shared way in the process of identity formation by stakeholders, which may be directly linked to understanding the social dimension of the issue of water resource management, especially freshwater water resources Colvin *et al.*(2020), which ultimately is the management of biodiversity on a variety of scales.

The management of water resources, as well as the management of protected areas, constitute the management of biodiversity and are generally complex and often consist of connected systems operating at multiple scales and multiple forms of governance, Soliku&Schraml, (2020). What ultimately distances part of those involved in the management process shared by stakeholders, when it comes to the riverside and/or local community, in general, is the complexity of understanding this management, along the lines of scientific production that generally distances the concept of the theoretician from the subject involved in the process, and the use of scientific production has been increasingly decisive in the governance process, Wang *et.al*. (2016).

The multiple forms of governance, taking into account stakeholders, for water resource management, requires the increasingly intense use of scientific production aimed at this end, especially in the human-nature interface that is relevant in adaptive decision-making, as an urgent need increasingly urgent in the face of the risk posed by global environmental changes, Gorgeous, (2020).

Aware of the vulnerability to which natural resources are passing, decisions in the face of the management of these resources increasingly need decision-making to occur in a shared way and, above all, from concepts produced from scientific knowledge, thus minimizing the risks of irreversible damage to the environment.

Scientific production focused on the management of natural resources and thus also of water resources has used concepts from other areas adapted to the environment increasingly such as the

concepts of resilience[2] and vulnerability[3], promoting a movement of convergence between the conceptual theoretical frameworks of resilience and vulnerability Lindoso, (2017), making their connectivity between the various areas and the environmental sciences, leading to the understanding that there is an urgent need for shared management in which natural resources are considered as a necessary part of preservation is an inherent presupposition to the shared management process linked to the preservation of biodiversity in the most different terrestrial biomes.

MATERIAL AND METHODS

In order to map the international scientific production in the areas of Social and Natural Sciences in the context of Water Resources Management, a Bibliometric analysis was performed, through bibliometric methods such as evaluative techniques, relational techniques, and visualization of bibliometric data techniques using the VOSviewer program.

Scientific mapping aims to construct bibliometric maps that describe how specific areas, scientific domains, or fields of research are conceptually, intellectually, and socially structured, Cobo, López-herrera, Herrera-Viedma, (2011).

In this study, the database used was the Web of Science (WoS), the choice of the WoS database was based on the understanding that it was sufficient for the analysis of scientific production directed to the management of water resources, the main collection. WoS allows researchers to access scientific articles from all areas of activity, providing data on results, dissemination, collaboration, and impact of Albort-Morant research; Ribeiro-Soriano, (2016). Journals indexed in WoS have an associated impact factor in JournalCitationReports (JCR), so the articles accessed are evaluated by a peer-review process, certifying the knowledge generated Okumus*et al.*,(2019).

The search in the WoS database was conducted on April 6, 2021. The research strategy took as a search protocol, the initial consultation focusing on the keywords "water resources" or "govern" or "stockholders", the school of these terms was the approximation of them with the management

of water resources, considered the journals classified in the indexes: Science Citation Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI) and Emerging Sources Citation Index (ESCI), because there are journals in both indexes that are related to Natural and Social Sciences, which allows us to expand the analysis covering more scientific literature in the field of study. The period was used for the years between 2010 and 2021, resulting in a total of 185,610 articles located.

Following, two search filters were operationalized. The first filter generated 55,315 articles with only scientific articles and English as the criteria for inclusion in the document type. In the second filter, the following research areas were included: Environmental Sciences Ecology, Business Economics, Urban Studies, Anthropology, Social Issues, Public Administration Sociology, totaling, in the end, 552 articles.

Then, aiming at the use of VOS viewer software, the research result was exported and recorded the content (complete record and cited references) in a file format separated by win tabs, aiming at the use of the data for the elaboration of bibliometric analyses.

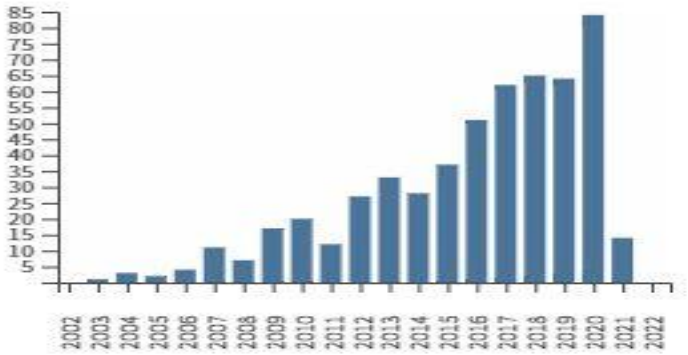
The first stage of the results consists of evaluation related to research areas, journals, countries, references with a higher number of citations, and more relevant studies of the H factor (H-index). The second step used the software VOSviewer version 1.6.15.VOSviewer is software directed to the construction and visualization of bibliometric networks, analyzing a cluster solution at the aggregate level Van Eck; Waltman,(2017). The use of VOSViewer software enabled the organization of co-citation-based groups (cluster) and the networks of keyword co-occurrences.

RESULTS AND DISCUSSIONS

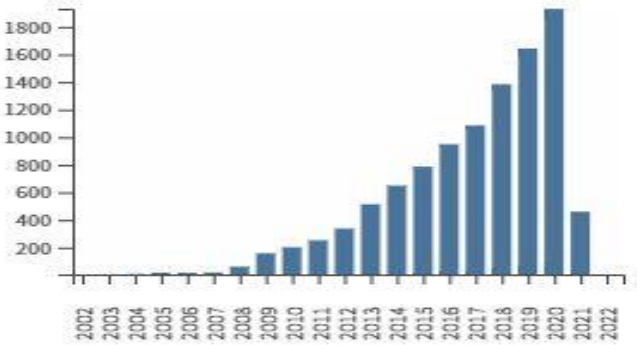
The results of the study were evidenced in three stages of bibliometric analysis, the first described the evaluation related, from the categories used in the Web of Science, to the countries where the articles were published; research areas, journals, most cited authors, and more relevant works. In the second section, the results are presented and discussed, based on VOSviewer data, of networks with co-authorship clusters and keywords with greater relationship and frequency in publications on the subject. And in the third stage of the bibliometric analysis, the Citation Network was identified with the most relevant publications, ranking publications by citation

score, the research also performed an analysis of the studies considered a reference in the citation network, highlighting the main purposes and/or results of each study.

The research identified 552 publications indexed in the WoS database, made available as of the consultation date (April 6, 2021) from the database The sum of the number of citations was 10,485, with an average of 18.99 citations per publication, and an h-index of 51. Considering the entire period can be observed that from 2016 the number of items published per year was increasing considerably and remained in a certain constant graph 1 A and the citations follow the same graphical logic 1 B.



Graph 1 A - items published by year - source: web of science (2021)



Graph 1 B - citations per year - Source: web of science (2021).

Based on the data from the WoS, considering the ten areas with the highest number of registrations, the following areas are in descending order: environmental sciences with 341

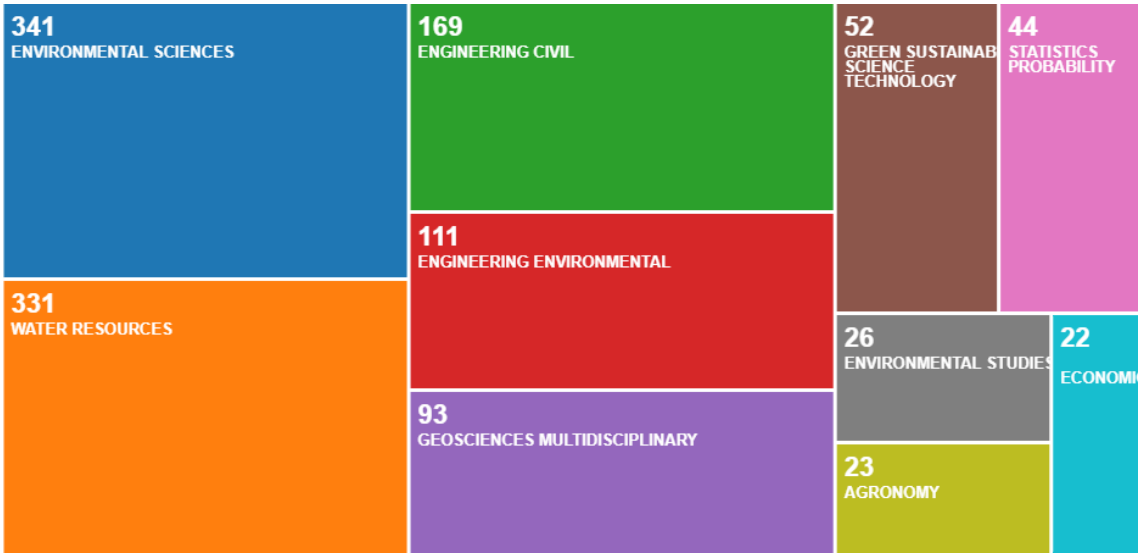
records and 62.775% of the 552 articles, water resources with 331 records and 59.964%; civil engineering with 169 records and 30.616%; environmental engineering with 111 records and 20.109%; multidisciplinary geoscience with 93 records and 16.848%; green science technology with 52 records and 9,420%; probability and statistics with 44 records and 7.710%; environmental studies with 26 records and 4,710%; agronomy with 23 records and 4.167% and savings with 22 records and 3.986%, see table 1.

Table 1 - The ten areas with the highest number of records in the Web of Science database

Field: Web of Science Categories	**Record count**	**% of 552**
ENVIRONMENTAL SCIENCES	341	61.775 %
WATER RESOURCES	331	59.964 %
ENGINEERING CIVIL	169	30.616 %
ENGINEERING ENVIRONMENTAL	111	20.109 %
GEOSCIENCES MULTIDISCIPLINARY	93	16.848 %
GREEN SUSTAINABLE SCIENCE TECHNOLOGY	52	9.420 %
STATISTICS PROBABILITY	44	7.971 %
ENVIRONMENTAL STUDIES	26	4.710 %
AGRONOMY	23	4.167 %
ECONOMICS	22	3.986 %

Source: Web of Science (2021).

The option to analyze the ten areas of greatest relevance was basically due to the cutting criterion since from the tenth area there was a certain repetition of the number of articles by related areas, a factor that decided to opt for the observation of the top ten with the highest number of records and therefore representing a larger percentage of the sample of 552 articles considered based on the criteria described above, see Figure 1, when the observation starts from the authors with the highest number of review we have the results of table 2, below, which presents the following results.



Source: Web of Science, 2021.

Figure 1 - Web of Science category with greater relevance of the authors with the highest number of records Huang stands out with 190 records and 34,420% of the 552 articles, Sing and Shang Y. appear with 112 records and 20,290; Liu with 110 records and 19.022%; Li Y. P.com 105 records and 19.022%; Shang Q.com 28 records and 5.072%; Fan with 25 records and 4.529%; Zeng with 21 records and 3.804%; Gio with 17 records and 3.080% and Li W.com 15 records and 2.717%. See table 2.

Table 2 - The ten authors with the highest number of records in the Web of Science database

Field: Authors	**Record count**	**% of 552**
HUANG GH	190	34.420 %
SINGH VP	112	20.290 %
ZHANG Y	112	20.290 %
LIU Y	110	19.928 %
LI YP	105	19.022 %
ZHANG Q	28	5.072 %
FAN YR	25	4.529 %
ZENG XT	21	3.804 %
GUO P	17	3.080 %
LI W	15	2.717 %

Source: Web of Science (2021)

The authors mentioned in Table 2 above are authors who roughly publish in the areas highlighted in Table 1, even if there is no mandatory correlation between the studied area and the number of citations, in the specific case of this study there is a correlation, see Figure 2.

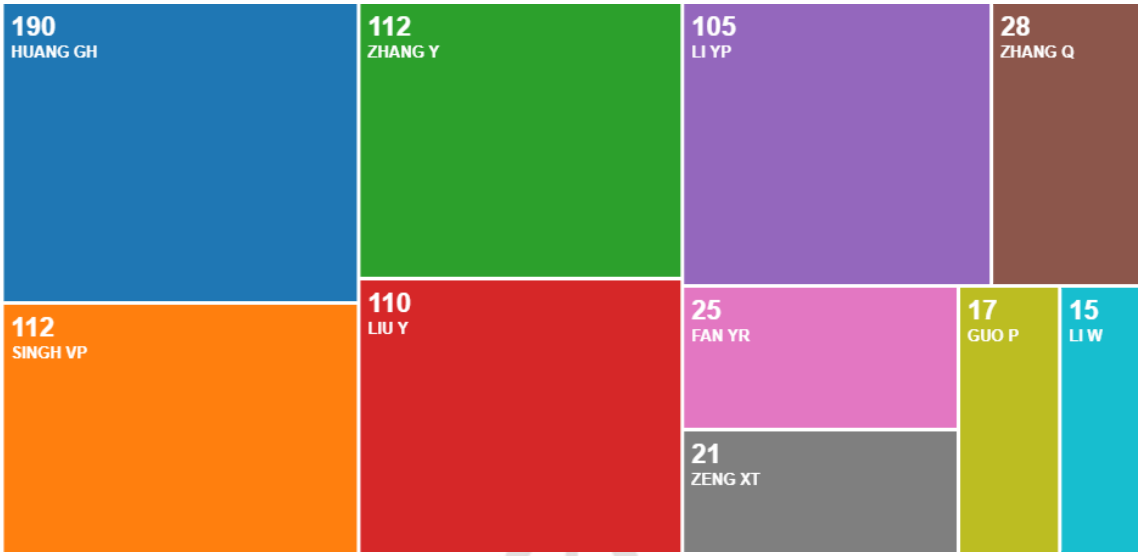
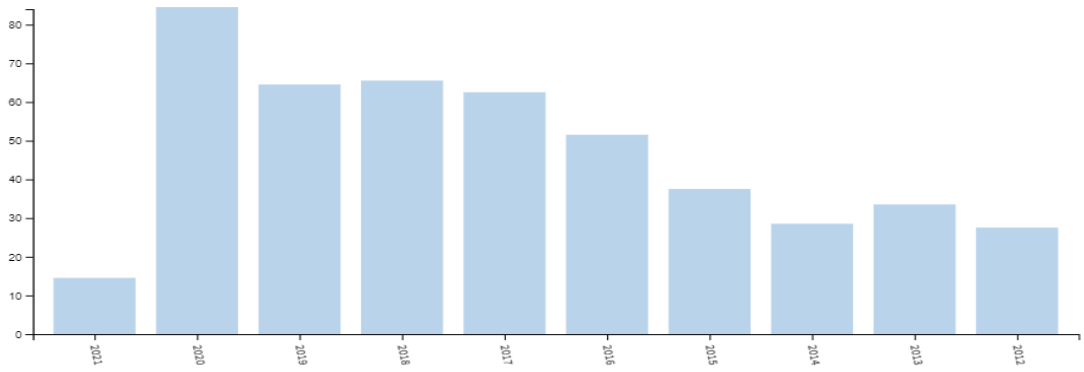


Figure 2 - Authors by number of citations

Source: Web of Science, 2021.

Within this analysis logic and refining categories using the exclusion and redefinition criteria and, based on the criterion year of publication, from 2010 to 2021 the years with the highest number of publications were the years 2016, 2017, 2018, 2019, and 2020, which can be understood that these years were decisive in scientific understanding for the production of articles aimed at the management of water resources, considering Brazil, discussions on the subject including the enactment of laws for water management occur in this period specifically in 2017, although later when analyzing the countries and regions with the highest participation in publications Brazil does not appear among the ten with the highest number of publications, see graph 2.



Graph 2 - Data by years of publications

Source: Web of Science, 2021.

When refining occurs in countries and regions where it is most published in the studied area, China, the United States, and Canada with publication numbers above 160 stand out, the other countries range from 20 to 7 publications, this does not necessarily mean that the country has in its authorities reference in the theme, but that the scientific community is more involved in the concerns with production involving the management of water resources, see figure 3.

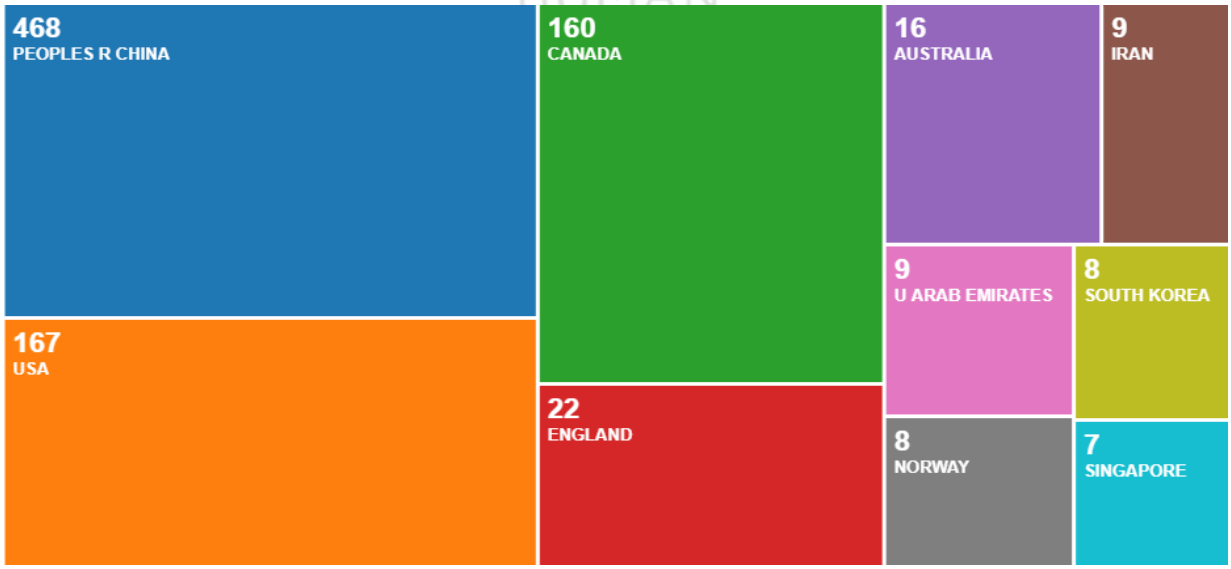


Figure 3 - Countries with the highest number of citations

Source: Web of Science, 2021.

In the analysis of the bibliometric map of co-authorship, by authors, Figure 3, it was considered the inclusion of all authors with at least five publications in the scope of the research, and who presented a number of citations, including the connected authors. The complete network has a total of 1,400 authors, the universe of publications researched, however, the VOSviewer software limits the visualization of 1,000 authors, so it adopted full counting do software. However, many of these authors, as shown in Figure 3, do not belong strongly to any cluster. Figure 4 presents a very dense network with nuclei of interconnected authors strengthening the cluster.

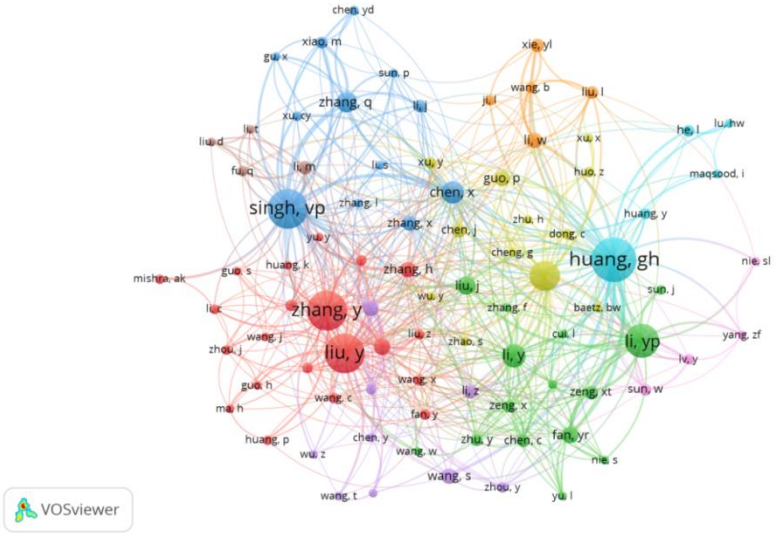


Figure 4 - Bibliometric map of co-authorship, by authors

Source: Prepared by the authors, 2021

Were found 88 authors, with 87 connected, formed 9 clusters, with 611 links and 1,488 strongly connected links, considering that they were used as analysis criteria and that each author had at least five citations. Cluster 1, in red color, with the main theme of studies related to topics such as environmental engineering, presents 21 authors, 52 links, 108 strongly connected, 106 documents, when it comes to citations, with 243 citations.

Cluster 2, in green color, with themes related to aquatic research studies, presents 15 authors, 21 links, 41 strongly connected, and 11 documents, were cited 243 times; cluster 3 in blue color with studies related to the theme of water reference and civil engineering, presents 12 authors, with 35 links, 100 strongly connected, 33 documents and 999 citations; cluster 4 in color shown

from studies related to environmental engineering with 12 authors, 8 links, 14 strongly connected and 60 citations; cluster 5 in the lilac color of studies related to geoscience and multidisciplinarity with 5 authors, 13 links, 17 strongly linked, 6 documents and 34 citations; cluster 6 in the light blue color of studies related to sustainability and technology with 8 links, 20 strongly linked, 10 documents and 350 citations; cluster 7 in orange color of studies related to statistics and probability with 5 authors, 9 links, 17 strongly intertwined, 8 documents and 90 citations. Cluster 8 in purple color related to environmental studies with 4 authors, 9 links 26 strongly linked, 8 documents, and 113 citations, and cluster 9 in the indigo color of studies related to agronomy and economics, with 4 authors, 11 links, 25 strongly interconnected and 176 citations.

When the mapping occurred by co-authorship and organizations, 497 organizations were found, of which 46 were strongly interconnected considering that each had at least five documents per organization, based on these criteria, 6 clusters with 228 links were formed, of which 195 were strongly interconnected. See Figure 5.

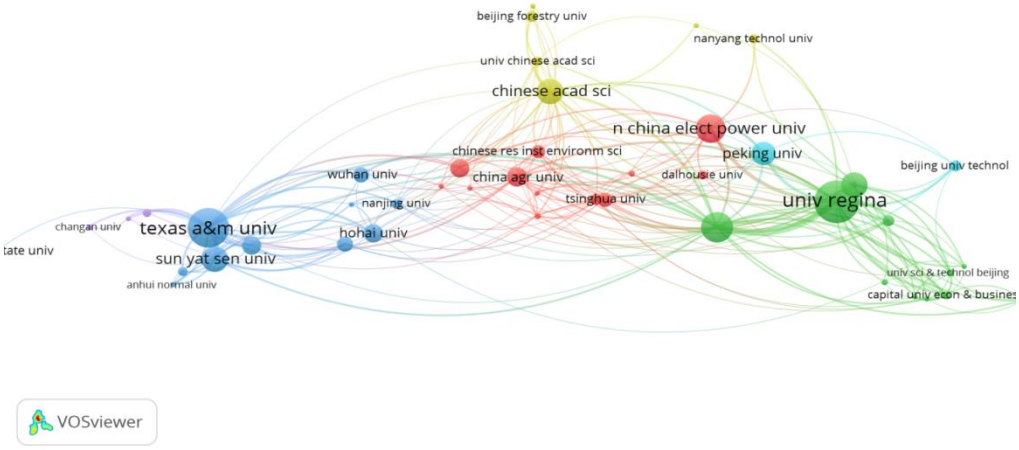


Figure 5 - Network of co-authoring by organizations

Source: Prepared by the authors, 2021.

Cluster 1, in the red color with 12 institutions, 637 links, 34,533 with strong intensity, and 19.9062 documents; cluster 2 in green color with 11 institutions, 68 links, 5 with strong intensity, and 9,714 documents; cluster 3 in blue color with 11 institutions, 5 37 links with strong intensity and 2 documents; cluster 4 in mustard color with 6 institutions 10 links, 227 strongly attracted and 22 documents; cluster 5 in color seals with 2 institutions, 10 links, 221 strongly interconnected and 22 documents.

Another analysis option was the mapping by co-authorship and publishing countries obtaining the following results, 14 items found, 4 clusters, 43 links, and 405 strongly interconnected links giving rise to the map in Figure 6.

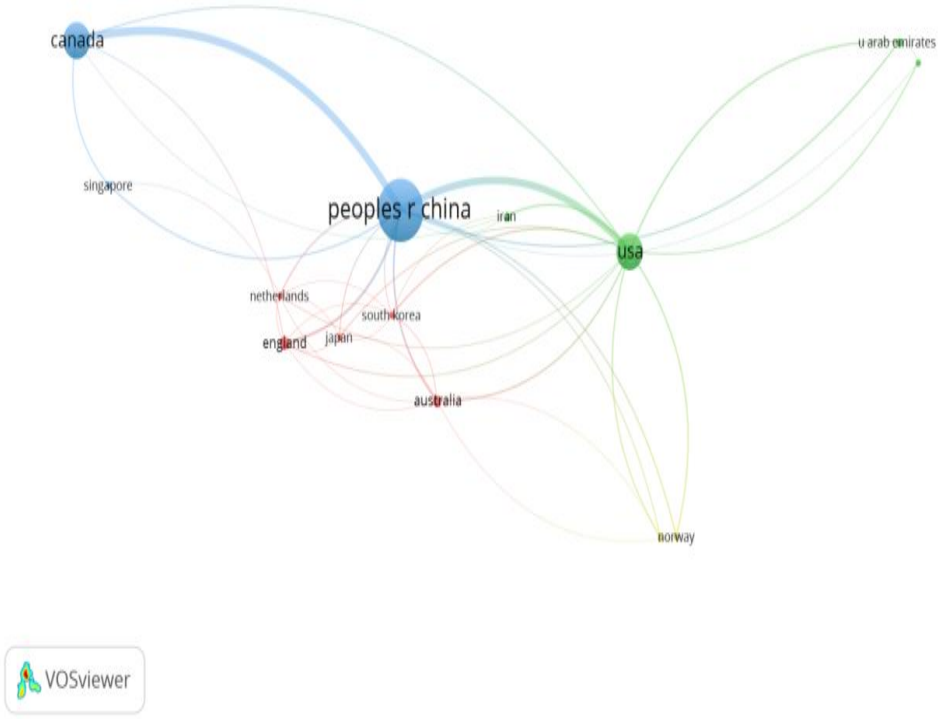


Figure 6 - mapping by co-authorship and publishing countries

Source: Prepared by the authors, 2021 from VOSviewer

In cluster 1, in lilac color with 5 countries, 583 links, 26 strongly interconnected, and 36.4375 documents; cluster 2 in green color, with 4 countries, 7 links, 5 strongly interconnected and 1,203 documents, cluster 3 in blue color, with 3 countries 143 links, 158 strongly interconnected and 20.8365 documents and cluster 4 in mustard color with 2 countries, 20 links, 8 strongly interconnected and 1, 9514 documents.

After the analysis was performed from the co-authorship and authors, organizations, and countries, a new analysis was elaborated with co-occurrence keywords and keywords and authorship, for the analysis in co-occurrence and keywords, 2,982 words were obtained, with 195 strongly interconnected, 6 clusters, 4,184 links and 8708 strongly interconnected links considering at least five occurrences per document, obtaining the map in Figure 7.

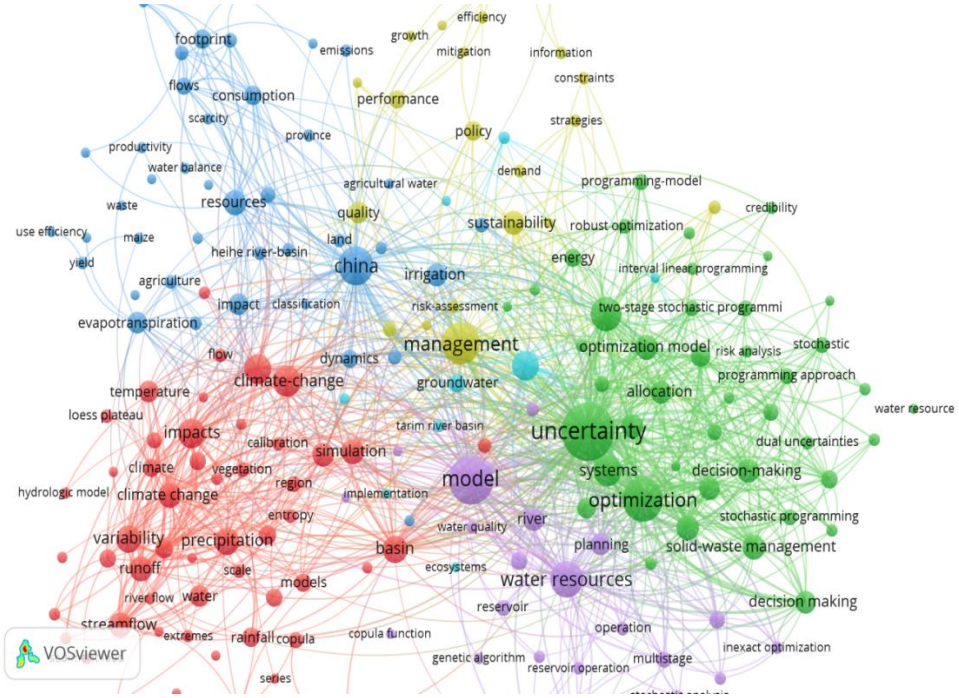


Figure 7 - co-occurrence and keyword mapping

Source: Prepared by the authors, 2021, from VOSviewer

Cluster 1 in red color with 54 words, 60 links, 117 strong and 1.1814 occurrences; cluster 2 in green color, with 43 words, 79 links, 220 with strong impact, and 1.4348 occurrences; cluster 3 in blue color with 25 words, 36 links, 17 with strong impact and 1.1393 occurrences; cluster 5 in

lilac color with 23 words, 47 links, 99 strong and 1,278 occurrences and cluster 6 in light blue color with 9 words, 38 links, 8 with strong impact and 1.8105 occurrences.

When the analysis occurred by co-occurrence and keywords per author, 1,819 words were obtained, with 57 strongly interconnected, 6 clusters, 334 links, and 814 strongly interconnected, considering at least 5 occurrences in each document per author. With these conditions, the map in figure 8 below was obtained.

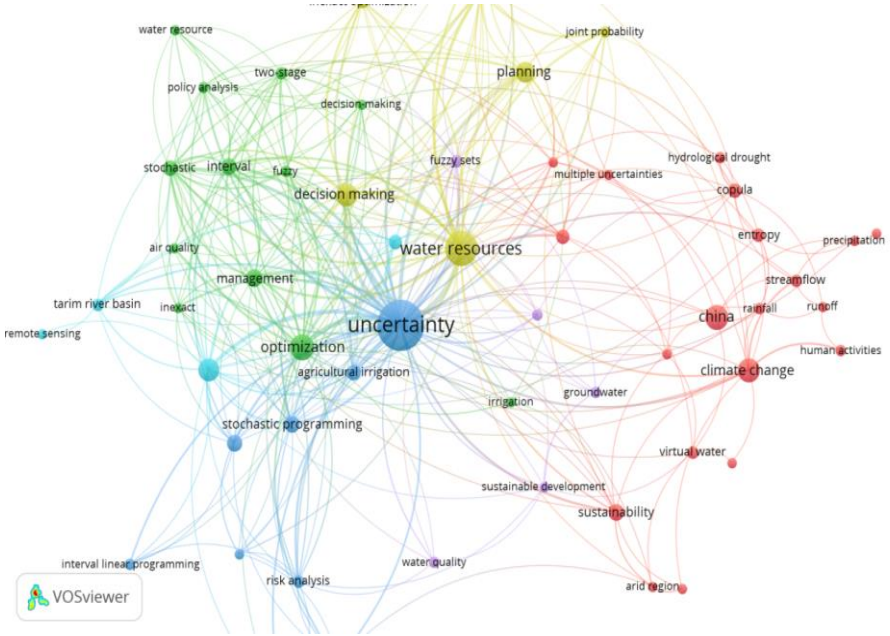


Figure 8 - mapping by co-occurrence and keywords by author

Source: elaborated by the authors, 2021, from VOSviewer

In the first cluster in red color, with 20 words, 40 links, 30 with strong neighborhood impact and 1.2134 occurrences; cluster 2 in green color with 12 words, 16 links, 29 strongly interconnected and 691 occurrences; cluster 3 in blue color with 44 links, 288 with strong impact, and 8765 occurrences; cluster 4 in mustard color with 7 words, 19 links, 58 strong impact, and 1.1551 occurrences; cluster 5 in lilac color with 5 words, links, 7 strongly linked and 4702 occurrences and cluster 6 in lime green color with 4 words, 2 links, 2 strong and 5532 occurrences.

CONCLUSIONS

Developing planning and/or project of water resources management is increasingly necessary, since it is a scarce and therefore economical good, and, essentially life, efficient planning in quantity and quality requires dexterity and management skill on the part of planners condition *quo si mon*a granting the use of water for training and release of effluents with the effective participation of decision-makers, institutions, and the local community.

Since water is an indispensable natural resource for life, economic development, and social well-being, and, perceived that it is becoming increasingly scarce, it is necessary for the scientific community to allocate technical resources to its management in order to use the resource sustainably, in this sense, and, from the analysis carried out in this study, it was clear that in general the scientific community, especially to universities has allocated time and resources to the study of water resources management, which is based on the number of productions identified for the database and especially by the production biases linked to the keywords used in the search for the constitution of the database from the Web of Science.

The problem of the amount and quantity of water on the planet results from its use by man and by natural phenomena, factors that must be taken into consideration by planners so that the results are as close as possible to efficiency.

Efficiency is directly linked to the knowledge of the various mechanisms of operation and management, as well as the functional characteristics of the good, considering that decision-makers are directly linked to the mechanisms of use and management of the resource and are highly knowledgeable of the mechanisms of cycling and distribution of the same, so that terms such as scarcity, distribution, and access need to be directly linked to planning, since water is an essential good to any form of life and that for humans this should not be linked to the conditions of social stratification.

In this sense, considering that this bibliometric study was used to assemble the database of the keywords: water resources, management, governance, and stakeholders, no one from using terms such as scarcity, distribution, access, and social stratum, as well as other terms also important for the study of water resources, since this is an essential good to live, it is advisable that for future studies, the use of these terms and related terms should be sought in the Web of Science database

or in other databases, since they are important to understand the structure of society, as it is directly organized from the use of water resources and its management is essential for the efficiency of this use.

Therefore, studies of a bibliographic nature and that are linked to the management of water resources are necessary to assemble their database based on terms that justify the understanding of the nature and understanding of the good for the most varied social strata in the most varied countries and continents, since the value of use and the value of exchange of resources is directly related to the level of education and the substantive needs of society that make up the country, and the bibliometry allows the researcher to understand this internationally by searching for productions in the most varied corners of the planet from the database of productions already consolidated.

REFERENCES

1. Alvin, R. M. Witt, G. Bradd. Lacey, Justine. Power, perspective and privilege: the challenge of translating stakeholder theory from business management to environmental and natural resource management. Journal of Environmental Management, 2020. HTTP://www.elsevier.com/locateljeuvmam.
2. Alberto-Morant, G., Ribeiro-Soriano, D. A bibliometric analysis of the international impact of business incubators. Journal of business research, v.69, n.5 p. 1775-1779, 2016.
3. ANA, National Water Agency - water in the world, 2021. Httpp://WWW.ana.gov.br/portal/ANA/panorama-das-aguas/água.no.mundo.
4. BECK, Ulrich. Risk Society: towards another society. Translation: Sebastião Nascimento. São Paulo: Publisher 34, 2011.
5. Campos, S.; Felipe, A.C.; Reche, A.M. Geoprocessing applied in the morphometric characterization of the microbasin of RibeirãoDescalvado - Butucatú - SP. Irriga v.1, n.1, p. 52, 2015. HTTP://www.repositório.unesp.br.
6. Castro, J. E. La privatizacion de los serviços de agua y saneamento in Latin America. Nueva Society, n.207, p. 93-112, 2007.
7. Cobo, M. J., Lopez-Herrera, A. G., Herrera-Viedma, E. and F.H. Science mapping software tools: review analysis, and cooperative study among tools. Journal of the américa Society for Information Science and Technology, v.62, n. Juky, p. 1382-1402, 2011.
8. Falk, C. Resilience: the emergence of a perspective for social-ecological systems analyses...Global Environmental Change, v.16 n.3, p. 253-267, 2006.
9. Gonzeli, José Paulo; Goldenstein, Stela.Planning of water resources. See. Adm. Empres. São Paulo, v.34, n.1, p. 38-49, FEB,1994.
10. Holling, C. S. Resilienceandstabilityofecological systems. AnnualReviwofEcologyandSystematics, v.4, p. 1-23, 1973.
11. Katikiro, Robert Eliakim. The role of local institutions in the governance of MPAS. Elsevier, 2020. Journal home page: HTTP://www.elsevier.com/locate/morpal.
12. Lindoso, Diego Pereira. Vulnerability and resilience: policies, convergences, and limitations in interdisciplinary research. Environment & Society. São Paulo, v. XX, nº 4, p. 131-148, 2017.
13. Mészáros, I. Beyond capital: towards a theory of transition. São Paulo: Boitempo, 2002.

14. Mioto, C. L.; Ribeiro, V. O.; Souza, D. M. Q.; Pereira, T. V.; Anache, J. A. O'NEILL, R. V. Is it time to bury the ecosystem concept? (WithFullMilitaryHonorsofCourse!). Ecology, v.82, n.12, p.3275-3284, 2014.
15. Okumus, F. et. al. A bibliometric analysis of lodging-context research from 1990 to 2016. Journal of hospitality and tourism research, v.43, n.2, p. 210-225, 2019.
16. Pereira, B. W. F.; Maciel, M. N. M.; Oliveira, F.; Ferreira, B. M. Pessoa, Z. S., Teixeira, R. L. P.Vulnerabilities and risk society in times of COVID-19. Metropolitan Observatory: National Institute of Science and Technology, 2015. https://www.observatoriodasmetropoles.net.br/vulnerabilidades-e-sociedade-de-riscos-em-tempos-de-covid-19/. Acesso: 29 Janeiro 2022.
17. Soliku, O. Schraml, V. Protected areas management: A comparison of perceived outcomes associated with different co-management types. Elsevier, 2020.
18. Tucci, Carlos E. M. Water Management Magazine in Latin America – Rega/Global water partnership South America; - v.2 no2. (Jul/Dez/2005) – Santiago GWP/ South America, 2005.
19. Tundisi, José Galizia. Water resources in the future problems and solutions. Estud. Av. São Paulo, v.22, n.63, p. 7-16, 2008. HTTP//: WWW.scielo.br.
20. Vaneck, N. J., Waltman, L.CitNetExplorer: A new software tools for analysisandvisualizingcitation networks Journalofinformatics v.8, n.4, p. 1053-1070, (2017).
21. Zhang, X., Liu, Y., Zhou, L. Correlation Analysis between Landscape Metrics and Water Quality under Multiple Scales. Environmental Research and Public Health [online] 15(8), 2018.em: https://doi.org/10.3390/ijerph15081606. Acesso: 10 Feb. 2022.
22. Wang, G., Mang, S., Cai, H., Liu, S., Zhang, Z., Wang, L., Innes, J.L. Integrated watershed management: evolution, development and emerging trends. Journal of Forestry Research [online] 27, 2016: https://doi.org/10.1007/s11676-016-0293-3. Acesso: 15 Fev. 2022.
23. Chen, L., Tian, H., Fu, B., Zhao, X. Development of a new index for integrating landscape patterns with ecological processes at the watershed scale. Chinese Geographical Science [online] 19(1), p. 37–45, 2009: https://doi.org/10.1007/s11769-009-0037-9. Acesso em: 15 Fev. 2022.
24. Ikematsu, P., Bitar, O.Y., Longo, M.H.C., Campos, S.J.A.M., Ferreira, A.L. Analysis of the environmental function of permanent preservation areas in the evaluation of enterprises. Brazilian Journal of Environmental Sciences [online] 55, 2020: https://doi.org/10.5327/Z2176-947820200537. Acesso: 10 Feb. 2022.