

Current State of Russian Research in the Field of Water Resources Management

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Abstract. The issues of water resources management are of great theoretical and practical importance to ensure the socio-economic development of the country. This explains the increasing number of scientific publications on water management issues around the world. The aim of this article is to analyze the state of the national scientific research in the field of water resources management. Bibliometric analysis was used as a research method. The study resulted in analyzing the dynamics of publications in the field of water resources management, describing the characteristics of national scientific community, and identifying the key knowledge centers. It was concluded that problems of water resources management are not the center of attention of researchers in Russia now, but there is a growing interest in learning more about the subject. The indicators of scientific performance of the Russian scientists at the same time clearly show the potential for the development of this area of research.

1 Introduction

The vital role played by water resources in the socio-economic development of any country determines the considerable and increasing academic interest in their effective management issues. Over recent years, the number of publications on the problems of water resources use increases exponentially around the world. Most studies generally consider the problems of water resources management within the context of implementing sustainable development goals on the regional and global scale. Along with this, the most popular at the moment are such issues as monitoring the state of water resources, exploring the possibilities of their use in circular business models, as well as developing the modeling tools for decision-making in rational water resources management and water consumption.

Despite the fact that Russia is among the countries with large reserves of water resources (including freshwater reserves), the problems of increasing the efficiency of the country's water sector are highly acute.

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The purpose of the study is to analyze the state of domestic scientific research in the field of water resources management. The novelty of the study consists in the use of bibliometric methods to provide the complete solution for a wide range of search problems.

2 Materials and Methods

In this study, the authors used data from the Russian bibliographic database RSCI located on the eLIBRARY.RU platform, as well as the analytical toolkit hosted on this platform. Since registration in the RSCI database is a mandatory procedure for all national researchers, the analysis of the available information provides a fairly complete picture of the current state of the subject field of knowledge under consideration in the country.

The sequence of the study includes the following main stages, corresponding to the assigned research tasks, as: 1) analysis of the dynamics of changes in the interest in the water management issues; 2) evaluation of the impact of scientific publications; 3) characteristics of the vast scientific community, including scholars and researchers, with highlighting of the knowledge centers; 4) comprehensive overview of journals, which publish the results of domestic research on key water resources management problems; 5) broad assessment of level of the development of cooperation in the subject area under study.

The search query was performed by entering the keyword "water resources". The authors defined the subject of scientific research as "Economics. Economic Sciences". The authors at the same time did not set any temporal limitations on the study period. According to the type of the published materials, they chose journal articles, monographs and conference proceedings, while textbooks and teaching aids, annotations and reviews in journals were excluded, since they do not reflect the increase in the level of scientific knowledge. In the generated sample, only researchers affiliated with the Russian higher education institutions were manually selected. To study the impact of researchers' publications, the authors used their citation metrics. When characterizing the scientific community, the author team paid attention to the total number of researchers and their academic productivity, as well as to the organizations these researchers represent, and the geography of their allocation. Knowledge centers – the most productive and influential organizations – were determined by the authors based on the analysis of the following indicators: the number of researchers and the number of citations. When analyzing journals, attention was paid to their impact factor, as well as inclusion in international citation databases. The share of publications, produced in collaboration, as well as indicators of the scientific impact of publications written in co-authorship were analyzed to characterize the level of scientific collaboration.

3 Results and Discussions

The generated search query made it possible to obtain a selection of 655 publications, including 380 (58%) articles in scientific journals, and conference proceedings and monographs presented the remaining publications. The first publication on the problems of water resources was a monograph by Yu.V. Babina released in 1996, which addresses the issues of the rental approach application in the economic assessment of water resources [1]. However, over the next 15 years, the issue of water resources management was not popular among researchers. The appearance of isolated publications by several authors characterized that period of research.

Judging by the dynamics of publications and the number of citations, scientific interest in the studied subject area actively began to take shape since the 2010s (Fig. 1). This is

largely due to the publication of the monograph by V.I. Danilov-Danilyants and I.L. Khranovich “Water Resources Management. Coordination of Water Use Strategies” [2], which laid the conceptual foundations for studying the problems of improving the efficiency of water resources management in the country. This monograph has got over 200 citations with a normalized citation score 9.9. This study remains the most influential in the subject area under consideration to date.

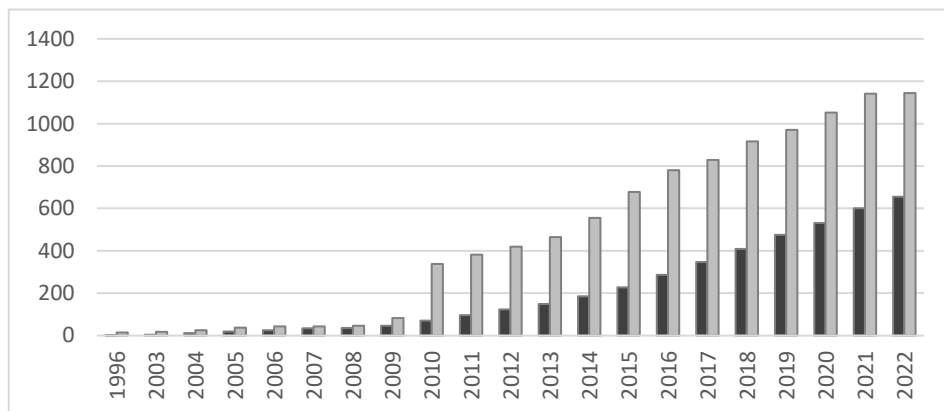


Fig. 1. Number of publications and number of citations cumulatively

Generally, one can note that monographs are the most cited publications, while the most popular are empirical studies reflecting the practice of water resources management in certain regions [3; 4]. Scientific publications that consider the financial aspects of water resources management [5], as well as water resources management in terms of achieving sustainable development goals [6], also have a high scientific impact. The study results showed at least one-time citation of 307 publications, representing 34.6% in the total number of articles. The papers presented at conferences and seminars have the least scientific impact, while self-citation in the studied subject area accounts for 12.6%, which indicates the continuity of conducted research.

The Russian scientific community, which systematically deals with the issues of improving the efficiency of water resources management, is not large. According to the RSCI data, the number of authors of publications in this subject area exceeds 1 thousand people. At the same time, a vast majority of them (about 97%) released sporadic publications on the problems of water resources management. Only 127 people from the analyzed sample have two or more publications on this topic, among them 18 people with five or more publications and only 3 people with more than 10 publications. Note that the most productive authors are also the most cited ones.

Among the Russian universities, the most productive ones are Southern Federal University (SFedU), Don State Agrarian University, Plekhanov Russian University of Economics, Lomonosov Moscow State University (MSU) and Ufa University of Science and Technology. To visualize the scientific positions of universities in the subject area "water resources management", the authors built a bubble chart (Fig. 2) that reflects: the number of scientific publications plotted on the X-axis; the number of researchers in the organization – on the Y-axis; the number of citations of the analyzed publications, in this case, will determine the point size. Figure 2 shows data on higher education institutions that have 10 or more publications on the issue under consideration. The authors believe that such a number of publications allows saying that these studies are not random and researchers conduct the trial in this specific scientific area systematically.

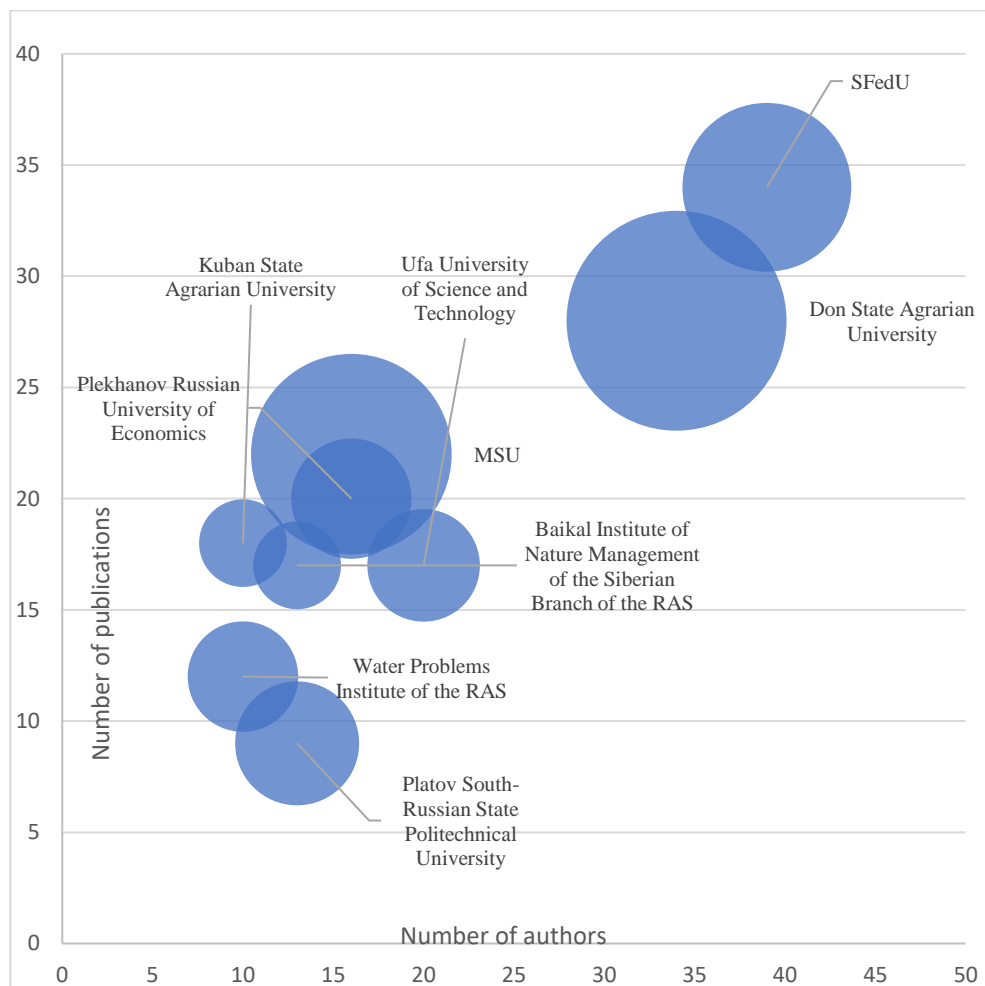


Fig. 2. Scientific positions of the Russian universities in the field of research of the water resources management problems

The data presented in Figure 2 above make it possible to identify two clusters. The first cluster includes Southern Federal University and Don State Agrarian University, which shape research agenda in water resources management issues. It is important to know that Moscow State University also has a high impact on the studied scientific subject, with a distinguished high citation score, while the number of authors and the number of publications in the subject area under consideration is smaller. These universities can be regarded as knowledge centers, while the remaining universities shown in the figure 2 can be defined as universities of moderate scientific impact; they have a small number of studies and publications addressing the problem with low citation indicators.

The results of research on water resources management issues are published in various journals, which have either a narrower, more specialized or multidisciplinary sector of thematic focus. The most popular among the authors are the following journals: "Journal of economy and entrepreneurship", "Regionalnye problemy preobrazovaniya jekonomiki" [Regional problems of transforming the economy], "Water sector of Russia: problems, technologies, management" and "Innovacii i investicii" [Innovation & Investment]. The abovementioned journals published five or more articles on the subject matter over the

years. Overall it is worth pointing out that the weighted average impact factor of journals, which publish the articles on the subject under study on a regular basis is rather low – 0.341. At the same time, the authors found that 13 articles (3.5%) out of a total number of journal articles were published in scientific journals indexed in the international databases WoS and Scopus, and 26 articles (6.8%) in the journals included in the RSCI database. This suggests that the studies of the Russian authors are of interest to the world scientific community. High citation indicators also confirm an increasing interest in these articles subjects, among which the most popular are studies aimed at developing the modeling tools for decision-making in the area of the rational water resources management and water consumption [7–10].

On the issue of the level of the cooperation development in conducting research on water resources management problems, one can see that most of the work was carried out in collaboration. Only 296 publications (45%) have a single author. The most common is intra-university interaction. International cooperation is almost non-existent. Publications made in academic collaborations are distinguished by a higher level of scientific significance, as evidenced by the number of their citations. Most research papers conducted in collaboration have 2–3 authors. The largest number of co-authors in journal articles is 5 people. It is worth mentioning that the same trends as research papers in other subject areas are also characteristic for the overall co-authored publications on water resources management problems – higher indicators of scientific impact distinguish them.

4 Conclusion

The conducted research demonstrates the possibilities of using bibliometric methods to get an idea of how the scientific field “water resources management” is developing in Russia. The results obtained allow us to conclude that the problem under consideration is still not yet sufficiently popular in the Russian academic space. Nevertheless, interest in it is constantly growing, and the research results are significant not only for national science but for the world's science as well.

At present, the South Russian universities mainly shape the vector of scientific research in the field of water resources management, among them the knowledge centers are Southern Federal University and Don State Agrarian University, while Kuban State Agrarian University and Platov South-Russian State Polytechnic University have a moderate amount of influence on the development of this subject area.

Of course, the authors' findings have certain limitations due to the fact that the RSCI database does not reflect all research papers published by the Russian scientists in this subject area. Therefore, the authors' scientific interests are related to the study of other databases (including international ones) in order to understand to what extent the Russian researchers are represented there, as well as to what extent the research directions of domestic scientists correspond to the global trends.

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