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Water Security and Integrated Water Resources Management: Systematic review of the relationships between water governance models

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SUMMARY

Different theoretical and practical approaches address aspects of water governance. Despite this, SDG6 and its indicators make central two models of governance that guide the actions and water policies of the signatory countries of the 2030 Agenda: Water Security (WS) and Integrated Water Resources Management (IWRM). The main objective of this study was to systematically review the scientific articles published between 2009 and 2022 that jointly presented these three central concepts of SDG6 (Governance, WS and IWRM). Based on Prisma Protocol techniques and software such as VOSViewer and Iramuteq, the results showed that there were three groups of studies that were concerned with different aspects of this theoretical interweaving. The formation of contribution networks between authors, institutions and countries was verified, although incipient. Trends in the studies aim at new forms of evaluation and models that seek greater integration between sectors that deal with water, as energy and agriculture.

Key words: Governance. Integrated Water Resources Management. Water Security. SDG6. Systematic review.

INTRODUCTION

According to the World Water Development Report – WWDR (2021) water consumption has increased exponentially in the last century and water stress is already part of the reality of 2 billion people in the world. In this sense, created by the United Nations, the 2030 Agenda highlighted, in its objective number 6, the need to guarantee the availability of water to all living beings, a principle directly linked to the understanding of water security. Through its indicator 6.5 and sub-indicator 6.5.1, the agenda monitors the degree of implementation of Integrated Water Resources Management (IWRM) by nations, including cross-border cooperation, reinforcing the importance of a holistic view that encompasses from the local level, which deals with the availability and access to the resource, up to the institutional level on the subject.

Water Security (WS) encompasses the many factors that interfere with the availability and access to water, while the Integrated Water Resources Management (IWRM) is concerned with the organization of the main actors involved in the management and consumption of these resources in their multiple uses and instances. These two concepts are directly linked to the idea of water governance, understood as mechanisms that guide water policies and include a diversity of actors in decision-making (KATUSSIIME & SCHUTZ, 2020; OECD, 2018). Therefore, it is from governance that the systems or styles of water management depart, which are responsible for integrating actions and actors, making Water Security at the local level, a reality.

The central terms introduced by SDG6 such as Water Security, Integrated Water Resources Management and Governance have been gaining strength in discussions on the use and preservation of water, mainly coming from conferences and global institutions that guide actions in water management (UN, 2023; ECLAC, 2022; GWP, 2021). However, the multiplicity of related themes, added to the different contexts, models of approach and implementation of actions by countries and territories, brought the theoretical field to a stage of diffuse discussions,

diluting efforts that could be more aligned with the water policies that are already being implemented by the signatory countries of the 2030 Agenda through SDG6.

Only in the search in the Scopus database, considering academic productions that brought in their titles, abstracts or keywords any of these 3 terms individually, 9,973 works were returned. Following this argument, the identification and analysis of studies that involve not only one of the concepts, but their joint use, could help in a greater standardization of the field, allowing connections between studies and clearer guidelines regarding the effectiveness of policies and solutions that help achieve the goals and principles proposed by SDG6 at the global level.

Thus, as the main objective of this study, it is proposed to review, in a systematic way, only the scientific articles that presented the existing relationships between the terms Water Security; Integrated Water Resources Management; and Governance, published over the years. The aim is to analyze how the understandings of these terms were built in the field of Public Administration and Water Management, based on works that considered the interrelationships between the concepts.

Efforts towards the consolidation of knowledge that most contribute to the effectiveness of the actions and objectives outlined by SDG6 can allow interweaving between the applications of the central concepts of the agenda. These efforts would provide not only a full understanding of their relationships, but also the systematic identification of new concepts and solutions envisaged by the authors most aligned with the theme at a global level. Thus, the present study contributes to knowledge, facilitating new research and stimulating the consolidation of the field of study. Especially in the field of Public Administration, it would also help in decision-making by managers, as it would facilitate their alignment with global prescriptions and goals to be met.

In order to obtain the objectives of the study, the work continues with the Theoretical Foundation, which explores the central characteristics of the concepts and, in the sequence, the Methodological Procedures of the Systematic Review are presented, such as protocol, databases and software used. In the Results, bibliometric characteristics of the studies are explored, to then analyze terms, article classes and trends in studies and actions involving the theme. Finally, the conclusions and final considerations of the authors are presented.

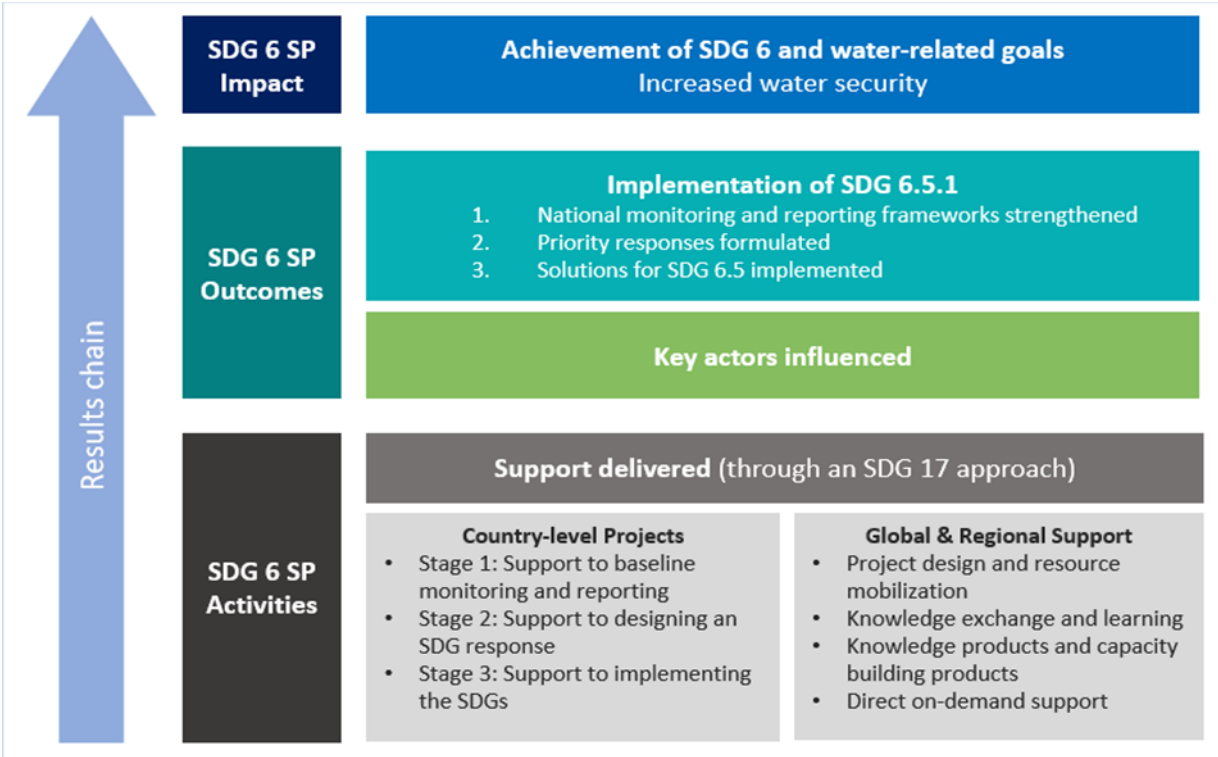
THEORETICAL BACKGROUND

The construction of the theoretical framework of this article sought to synthesize general knowledge about the main concepts addressed: The aim is to present the reader with a foundation prior to the review that allows a full understanding of the results and discussion.

Aspects of Governance in the core concepts of SDG6: Water Security and Integrated Water Resources Management

In the 1990s, new trends in public administration were consolidated and continue to this day. In this context, the term Governance gained space when dealing with the relationship between the State and Society, encouraging participation and deliberation in public matters that make up current government practice (CAVALCANTI, 2018). Specifically on water governance, Júlio et al. (2021) highlights that the complexity of water-related problems has led to the emergence of different approaches aimed at achieving a process of water governance. Among these approaches are IWRM and WS, water management analysis models guided by water governance at its different levels. This relationship was demonstrated by the Global Water Partnership (2021), which proposed the logical model of SDG6, with water security as the long-term impact of water management and governance actions (Figure 1).

Figure 1. SDG6 Logical Model for achieving water security



Source: GWP (2021). Available from: <https://www.gwp.org/en/sdg6support/test/about/>.

The right to water is translated into the concept of Water Security (WS), which concerns access to water in sufficient quality and quantity, at an affordable cost and in line with sustainability, valuing its production power and reducing its destructive power (GWP, 2014). Despite the conceptualization used, the concept of water security has multiple definitions and is

still under construction (GRAY & SADOFF, 2007; BAKER & MORINVILLE, 2013; GWP, 2014; MELO & JOHNSON, 2017; ADB, 2020).

Water Security is characterized as a continuous and dynamic objective, which varies according to the social, political and environmental context (OECD, 2015). In this sense, it is important to create and apply actions and strategies aimed at guaranteeing it, taking into account the dimensions in which it is involved. (MELO & JOHNSON, 2017). Factors such as urban growth, climate change, levels of deforestation and pollution indicate conditions of stress to the balance of water resources and, consequently, to Water Security (UNESCO, 2021). The forecasts are of scarcity and water crisis, however, the solutions are in the way the resource is managed, in the capacity and in the interactions between the institutions and actors that manage it, in addition to the general socio-political context (BIWAS, 2004; CUCIO & ZUFFO, 2015).

Integrated Water Resources Management (IWRM), on the other hand, is configured as a political strategy to achieve Water Security, being considered by the main Governance institutions of the planet a paradigm predominant in the management of water resources by territories, nations and regions. In its principles, IWRM considers water as a vulnerable and essential resource, in addition to being endowed with economic value (UN, 1992). The concept gained prominence in 1992, at the International Conference on Water and the Environment, in Dublin, Ireland, in which its characteristics and pillars were established.

IWRM is characterized by participatory and coordinated management, which includes all individuals, institutions and factors that may be directly or indirectly involved with water resources, in favor of sustainable and equitable development, in addition to considering the watershed and riverbasins as a target territorial unit management (UN, 1992 ; GWP, 2000; KATUSSIME & SCHUTZ, 2020; JÚLIO et al., 2021).

With that in mind, IWRM presents itself as a governance model at the macro level, since it structures water management at the river basin level and establishes the position of the various actors in the decision-making processes, enabling Water Security to occur at the local level . Therefore, IWRM plays a fundamental role in adapting or overcoming these challenges, as it is a mechanism that presents a holistic view that considers the multiple uses and decision-making instances, uniting the guarantee of access to the preservation of the resource (GWP, 2000; MOLLE, 2009; WANG, 2016). In this sense, a relationship is established between the concepts of WS, IWRM and Governance. The central objective of Water Governance and Integrated Water Resources Management is Water Security.

However, the relationship theoretically found between the concepts has faced interaction difficulties in practice. This is because, due to the context of imbalance in the sustainable use of

the resource, it is seen that countries still face several problems in establishing IWRM, to achieve Water Security and revert possible chaotic scenarios. In many countries, there is a low level of IWRM implementation, making it necessary, by 2030, to double the rate of implementation of this system, among the 227 countries, 107 walk slowly towards IWRM, which corresponds to 47, 1% of countries (UNEP, 2021). Therefore, approximately half of the countries in the world are not finding ways to build policies aimed at sustainable water management and, consequently, the guarantee of Water Security (UNEP, 2021).

There are flaws in the governance and organization of the actors directly involved with water. The following review seeks to delve into the issue, planning knowledge and providing new theoretical perspectives.

METHODOLOGICAL PROCEDURES

Regarding the methodology, a Systematic Literature Review (SLR) was put in place. For Siddaway et al. (2019), Systematic Reviews are a particular type of study that present a methodical, clear and replicable methodology. In this sense, the choice for this type of review was based mainly on the scientific rigor it provides. The RSL gather a certain amount of studies related to a specific theme, through eligibility criteria. The methods follow an explicit and systematic protocol, so that there is less risk of bias (COCHRANE, 2008). According to the “Cochrane handbook for systematic reviews of interventions” (2008), this type of review has the following characteristics: clear objective; reproducible methodology and explicit study selection criteria; and an organized synthesis of the results found in the selected studies.

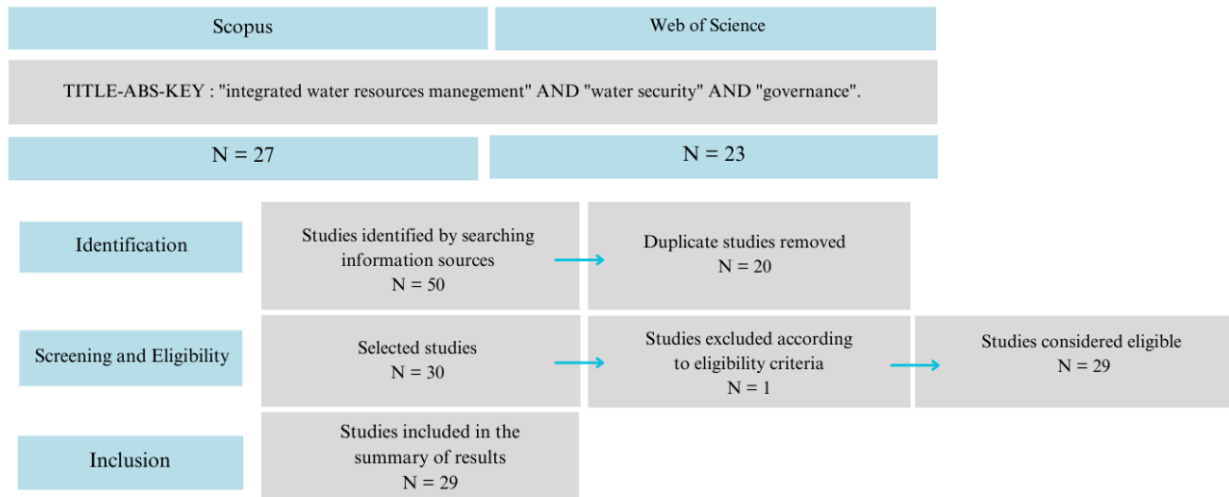
Data collection and review protocol

For the structuring of the collection, the recommendations established by the PRISMA protocol (2020) were followed. Searches were carried out between January 10 and March 20, 2023, in the Web of Science and Scopus databases, which ensures good quality in the selected studies. Furthermore, during the research, search terms associated with the Boolean operator “AND” were applied, seeking only papers that focused concomitantly on the 3 terms reviewed . It was decided to search by topic (title, abstract and keyword) in both databases, which generated a sample of 50 articles throughout 2001 and 2022.

Priority was given to selecting studies that exposed in their abstracts, relationships between the research target concepts and articles that extrapolated the limits of the concepts used, bringing conceptual interweavings and broader views on different levels of water governance. The exclusion criteria used was the elimination of replicates (20) and lack of access to the article (only 1). The studies were organized in Excel tables for each database and for each search

strategy. After that, the findings were organized in ascending order, by the volume of citations and then by the year of publication. It should be noted that two of the authors read the Titles, Abstracts, Keywords and texts in their entirety (Figure 2).

Figure 2: Flow Diagram demonstrating the search strategy and criteria application



Source: Elaboration of the authors.

After elimination process, 29 studies published between 2009 and 2022 were selected for more detailed analyzes. To allow the association and correct management of information from the articles, softwares such Mendeley, VOSViewer and Iramuteq were used. In them, the data made available by the databases were imported, allowing the association between authors; classes of articles and words with greater association. Through the techniques of chi-square statistical distribution on the content of abstracts (Iramuteq), and multiple lin/log regression on the content of the key-words e co-authorships (VOSViewer), multiple analysis were made and the results are presented next.

In summary, all of the 29 papers selected through the systematic literature review were considered relevant to the research, as they provided important contributions and insights into multiple levels of analysis, methods and reflections regarding water governance. The findings of this study could be useful not only to researchers, but also to practitioners and policymakers, who can use the results to inform their decision-making processes. Furthermore, the methodology used in this study can serve as a valuable reference for future research on the topic. Overall, the present study highlights the importance of conducting systematic literature reviews in order to provide a comprehensive understanding of a particular research topic and identify gaps in the literature that can be addressed in future research.

RESULTS AND DISCUSSION

In this section, central bibliometric characteristics of the studies were evidenced (Table 1). Next, relationships are established between authors, countries, institutions and terms used, capable of indicating the most predominant connections between the sample studies.

Table 1: Articles obtained as a result of the RSL for the core terms of the study

ID	(Authorship, Year)	Article Title	Cites	Source Title	JCR
1	(COOK; BAKKER, 2012)	Water security: Debating an emerging paradigm	452	Global Environmental Change	11,160
2	(BENSON; GAIN; ROUILLARD, 2015)	Water governance in a comparative perspective: From IWRM to a 'nexus' approach?	218	Water Alternatives	2,240
3	(ALLAN; XIA; PAHL-WOSTL, 2013)	Climate change and water security: challenges for adaptive water management	70	Current Opinion In Environmental Sustainability	7,964
4	(SCHMIDT; MATTHEWS, 2018)	From state to system: Financialization and the water-energy-food-climate nexus	44	geoforum	3,926
5	(GERLAK; MUKHTAROV, 2015)	'Ways of knowing' water: integrated water resources management and water security as complementary discourses	42	International Environmental Agreements: Politics Law And Economics	2,404
6	(VAN LEEUWEN; DAN; DIEPERINK, 2016)	The challenges of water governance in Ho Chi Minh City	32	Integrated Environmental Assessment And Management	3,084
7	(VARADY et al., 2016)	Adaptive management and water security in a global context: definitions, concepts, and examples	32	Current Opinion In Environmental Sustainability	7,964
8	(DE LOË; PATTERSON, 2017)	Rethinking water governance: Moving beyond water-centric perspectives in a connected and changing world	29	Natural Resources Journal	1,304
9	(PENN; LORING; SCHNABEL, 2017)	Diagnosing water security in the rural North with an environmental security framework	23	Journal Of Environmental Management	8,910
10	(STRINGER et al., 2021)	Climate change impacts on water security in global drylands	22	One Earth	14,944
11	(KUJINGA et al., 2014)	An analysis of factors contributing to household water security problems and threats in different settlement categories of Ngamiland, Botswana	21	Physics And Chemistry Of The Earth	3,311
12	(FALKENMARK; JÄGERSKOG; SCHNEIDER, 2014)	Overcoming the land-water disconnect in water-scarce regions: time for IWRM to go contemporary	20	International Journal Of Water Resources Development	3,776
13	(VAN LEEUWEN; SJERPS, 2015)	The City Blueprint of Amsterdam: An assessment of integrated water resources management in the capital of the Netherlands	17	Water Science And Technology: Water Supply	1,033
14	(FÖRSTER; DOWNSBOROUGH; CHOMBA, 2017)	When Policy Hits Practice: Structure, Agency, and Power in South African Water Governance	15	Society And Natural Resources	3,024

(Continued on the next page)

Table 1: Articles obtained as a result of the RSL for the core terms of the study (Conclusion)

ID	(Authorship, Year)	Article Title	Cites	Source Title	JCR
15	(JENSEN; NAIR, 2019)	Integrated urban water management and water security: A comparison of Singapore and Hong Kong	14	Water (Switzerland)	3,530
16	(VAN REES et al., 2019)	Ecological stakeholder analogs as intermediaries between freshwater biodiversity conservation and sustainable water management	8	Environmental Policy And Governance	3,136
17	(ARMSTRONG et al., 2013)	Water security and its challenges for Malaysia	7	ICEE 2013	-
18	(NSHIMBI, 2019)	SDGs and decentralizing water management for transformation: Normative policy coherence for water security in SADC river basin organizations	7	Physics And Chemistry Of The Earth	3,311
19	(KOOP et al., 2022)	Integrated water resources management in cities in the world: Global solutions	7	Sustainable Cities And Society	10,696
20	(HAILU; TOLOSSA, 2020)	Multi-stakeholder platforms: Institutional options to achieve water security in the awash basin of Ethiopia	5	World Development Perspectives	0.66 (JCI)
21	(CHOMBA et al., 2017)	Paradigms for water allocation in river basins: A society-sciencepractice perspective from Southern Africa	4	Water Policy	1,733
22	(LEE et al., 2022)	A Shift Towards Integrated and Adaptive Water Management in South Korea: Building Resilience Against Climate Change	4	Water Resources Management	4,426
23	(STERNLIEB; LAITURI, 2009)	Tracking political climate change: US policy and the human right to water	3	WIT Transactions On Ecology And The Environment	-
24	(MUNKHSULD et al., 2020).	Application of the city blueprint approach in landlocked asian countries: A case study of Ulaanbaatar, Mongolia	2	Water (Switzerland)	3,530
25	(TINOCO et al., 2022)	Water Resources Management in Mexico, Chile and Brazil: Comparative Analysis of Their Progress on SDG 6.5.1 and the Role of Governance	2	Sustainability (Switzerland)	3,889
26	(NICOLLIER; BERNARDES; KIPERSTOK, 2022)	What Governance Failures Reveal about Water Resources Management in a Municipality of Brazil	1	Sustainability (Switzerland)	3,889
27	(NKIAKA, 2022)	Exploring the socioeconomic determinants of water security in developing regions	0	Water Policy	1,733
28	(OLIVIERI et al., 2022)	Enhancing Governance Capacity to Ensure a Long-Term Water Supply: The Case of Windhoek, Namibia	0	Sustainability (Switzerland)	3,889
29	(RICHARDS; MKENDA; BJORNLUND, 2022)	Addressing water security through catchment water stewardship partnerships: experiences from the Pangani Basin, Tanzania	0	Water International	3,395

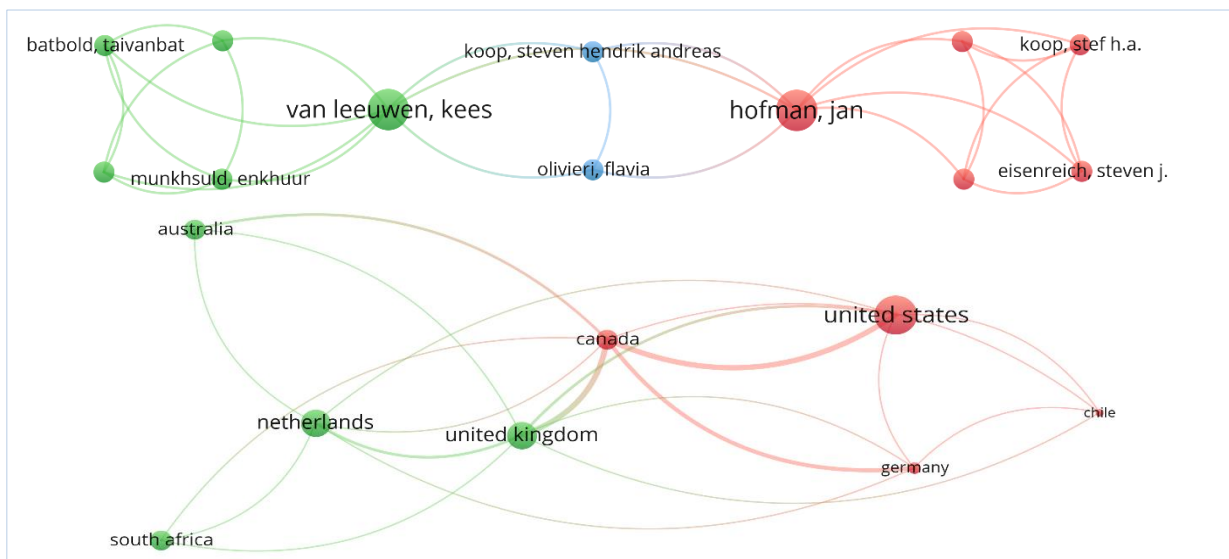
Source: Elaboration of the authors based on the research results.

All articles were published in international journals of impact or with a similar indicator, with the exception of articles 17 and 23, which are, respectively, an international conference and a journal not listed in the Journal of Citation Reports (JCR).

In a superficial analysis, one can already see the fragmentation of studies, with few reference exponentials that accumulate a larger volume of citations, as in Cook; Backer (2012); and Benson; Gain; Rouillard (2015). There are also few frequent authors in the works, indicating that it is an area still building its network consolidation.

In the analysis of authorial contributions and networks, the focus was on co-authorship connections. With the support of the VOSViewer software and through a unified and balanced base of articles elaborated with the support of Mendeley, the representations of the forces of interaction between the authors were formed through the multiple lin/log regression method (Figure 3).

Figure 3: Networks and strengths of connection between authors and countries in the sample



Source: Search results supported by VOSViewer.

In this figure, the terms are represented by sizes proportional to the intensity of their connections with other terms, and by colors that indicate subgroups of contributions, allowing the analysis of the discussion networks around the theme. It appears that there is still little interrelation between the studies that propose to intertwine the three concepts. Such dispersion is attributed to the fact that the terms adopted in the RSL are characterized by a strong practical bias, emerging as the result of international conferences and debates on Public Administration, not directly from a theory foundation. In this sense, it is evident the lack of more in-depth theoretical studies, which consolidate knowledge, allowing the evolution of the field.

Starting with the concept of water security, which, as already influenced by the terms of the review, is more intensely interconnected with the other prominent terms (Integrated Water Resources Management and Governance), and this relationship has intensified over the years. Gerlak's work (2015) describes this relationship, pointing out that a practical understanding of the concepts is necessary. Studies of IWRM practice and water security are important to add to the debate about what good water governance represents in a specific context (GERLAK, 2015).

In general, water security was represented in the articles as a substantive view of access to water, as it addresses social, gender, economic and geographic issues (LOE & PATTERSON, 2017; COOK & BAKKER 2012; REES, 2019; MUNKHSULD et al, 2020). Its most relevant associations were with SDG6 terms, institutions, land acquisition, water management, and river basin organizations. SDG6 is currently the concept that best represents global water goals. Its association with international, national, river basin, and local institutions is explained by the necessary commitment of the multiple actors so that nations can aim to fulfill this objective, which has as a glimpse, the long-term impact of guaranteeing water security (KUJINGA, 2014; GERLAK, 2015; LEEUWEN & SJERPS, 2015; NICOLLIER, 2022; REES, 2019).

With regard to IWRM, and its term in full, they are closely connected with terms such as public health, sustainability, Governance failure, gis and blue print approach. These terms represent the importance of coordinated action in favor of the sustainable management of resources, with special attention to the problems of implementing governance mechanisms (COOK & BAKER, 2012; GERLAK, 2015; NICOLLIER, 2022, TINOCO, et. al, 2022). Specifically, the term GIS refers to geographic mapping using software that has been a great ally in mapping resources and monitoring water management indicators (STERNLIEB, 2009). Finally, the terms blue print approach, blue city index and city blueprint refer to the methodology for local and territorial assessment of quality and level of integration in IWRM (KOOP et al. 2022; OLIVIERI, et. Al, 2022; MUNKHSULD et al., 2020; VAN LEWEN et al., 2015;2016).

Governance, on the other hand, was more used in association with the terms public health and river basin. The evident association with watersheds and their institutions stems from the important role attributed to them with the dissemination of the IWRM paradigm. Basins have become a territorial unit for the establishment of water management and governance authorities in multiple countries and the stage for collective and deliberative dynamics of water use (GERLAK, 2015; CHOMBA et al., 2017; PENN et. al, 2017; JENSEN & NAIR, 2019; NSHIMB, 2019; NICOLLIER, 2022).

Especially the association of water Governance with the terms nexus, agriculture and resilience, it was possible to identify a new theoretical and practical current that seeks to go

beyond IWRM in terms of coordination of actors and integration of human activities. Nexus, considered as a new approach or model, seeks to integrate not only the actors involved with the multiple uses and instances of water governance, but also the actors involved with the energy generation and agriculture sectors (BENSON, 2015; SCHIMIDT & MATTHEWS, 2018; JENSEN & NAIR, 2019). The model is based on the indissolubility of ecosystems, resilience in terms of actions and efforts of integration and the undeniable interrelation between these sectors. Despite its relevance, the studies indicate that its complexity can slow its dissemination, given the progress of IWRM.

Other terms such as Water policy and Sustainable development goals, demonstrated the importance of global governance initiatives and the involvement of nations so that they move forward with their water policies towards an increasingly sustainable and conscious development.

CONCLUSIONS

The systematic review carried out in this study highlighted the practical importance of intertwining the concepts of water security, Integrated Water Resources Management (IWRM) and governance. The findings indicate that an in-depth understanding of these concepts is crucial to achieving good water governance in different contexts. The review allowed for a better understanding of the challenges and opportunities at different levels of water governance analysis, from local to national and river basin levels.

The interconnection between the different components of water management is complex and multifaceted. Water is not only a vital resource for human consumption and economic development, but it is also essential for maintaining healthy ecosystems and supporting biodiversity. The management of water resources involves a range of interconnected issues, including sanitation, agricultural practices, energy production, and the preservation of ecosystem services.

Human action and institutional arrangements play a critical role in shaping the way water is managed, and effective governance is essential to ensuring the equitable and sustainable use of this finite resource. Integrated water resources management (IWRM) provides a framework for addressing the many competing demands for water and achieving water security in the face of increasing environmental and socioeconomic pressures. By recognizing the interdependence of different water-related sectors and developing a coordinated approach to water management, IWRM can help to ensure that water resources are used in a sustainable and equitable manner for present and future generations.

In this context, the importance of IWRM is highlighted as an approach capable of providing guidelines and instruments for the sustainable management of water resources. IWRM is essential to ensure the availability of water in adequate quantity and quality for society, ecosystems and the economy. In addition, IWRM allows for the integration of different sectors and actors involved in water management, contributing to the efficiency and effectiveness of water resource management.

The review also highlighted the potential of Nexus and the blueprint approach as exponent approaches and methodologies capable of supporting IWRM in practice. Nexus seeks to integrate the sectors involved in the management of water, energy and agriculture, emphasizing the interdependence of these sectors and the need for an integrated approach to the management of natural resources. The blueprint approach, on the other hand, focuses on the local and territorial assessment of the quality and level of integration in IWRM, providing a holistic and systematic view of the management of water resources.

However, it is important to highlight that, despite the diverse contributions presented by the reviewed studies, there is still an urgent need to strengthen the theoretical field of water governance, since the field is still diffuse and contributions and networks are still weak. It is necessary to invest in studies and research that consolidate and deepen the understanding of water governance, with the objective of building a solid theoretical and methodological framework that can support decision-making and the sustainable management of water resources at all scales.

There is still a predominance of technical materials compared to theoretical articles that focus on concepts and their applications. Therefore, it is crucial to improve the theoretical field of water governance, developing new theoretical and methodological frameworks, in order to contribute to the consolidation of a solid base for water governance and to the strengthening of networks and contributions in this area.

FUTURE DIRECTIONS

Based on these conclusions, future studies can focus on further exploring these concepts and methodologies, seeking to answer questions about how water governance can ensure an increasingly integrated management of resources and water security for present and future generations. These studies can contribute to the development of policies and actions capable of facing the challenges of water resources management, promoting environmental, social and economic sustainability.

This work represented an initial effort to gather the theoretical foundations and global initiatives that can support future research in the field of water governance. However, it is

important to highlight that this is only the beginning of a continuous and constantly evolving journey to improve our understanding of the challenges faced in managing river basins.

The gathering of these works will facilitate the search for methodological and theoretical approaches that allow for an increasingly holistic view of the management of river basins and global water resources, taking into account both technical and socio-economic and environmental dimensions. Methodological triangulation, through the execution of quantitative and qualitative studies, can be a useful tool in this process.

Finally, the need for a greater understanding of governance in river basins with greater institutional complexity, composed of many territories and realities, is reinforced, seeking to understand the challenges faced by managers and opportunities to improve water resources management. From this, we can develop more effective policies and practices to ensure the sustainability of water resources and water security for present and future generations of the planet.

As a future research agenda, the authors intend to deepen the studies reviewed in this work, with the objective of building an even greater theoretical and methodological framework that can be used by researchers and professionals involved in the integrated management of water resources and water governance in pursuit of water security.

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