A bibliometric review of global research on community-based water supply project governance: A PRISMA-based analysis

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ABSTRACT

This study provides a bibliometric review of global research on community-based water supply project governance using a PRISMA-guided approach. Peer-reviewed articles published between 2015 and 2024 were systematically retrieved and analyzed using VOSviewer to map publication trends, collaboration networks, influential journals, and thematic research clusters shaping this field. The results show a steady expansion of scholarly output, with a notable increase in recent years, indicating growing academic attention to governance challenges associated with community-managed water systems and the global pursuit of Sustainable Development Goal 6 on universal access to safe water. Bibliometric mapping reveals a collaborative but geographically uneven knowledge landscape. Co-authorship networks are concentrated around a limited number of institutions linked to international universities, development organizations, and policy research centers. Country collaboration patterns show strong dominance by developed countries—particularly the United States and the United Kingdom—while contributions from developing regions remain comparatively limited despite their centrality to community-based water supply initiatives. Keyword co-occurrence analysis identifies four major thematic clusters: health and water access, climate change and system resilience, governance and infrastructure management, and community costs, benefits, and technology. By synthesising the structural evolution and thematic orientation of the literature, this review contributes a systematic understanding of the field and highlights critical research gaps, particularly the need for stronger representation of Global South contexts and greater integration across governance, technical, and socio-environmental perspectives. The study further recommends strengthening research leadership in the Global South through equitable international collaborations, promoting interdisciplinary and comparative governance research, and reinforcing hybrid governance arrangements that combine community management with sustained institutional support to enhance the long-term sustainability of community-based water supply systems.

Key words: Bibliometric Review, Community Based Water Supply, Governance, Projects, PRISMA Model

I. INTRODUCTION

Access to clean and safe water for domestic use remains a critical global concern. As a finite and indispensable resource for human survival and socio-economic development, water has increasingly become a focal point of global tension. Rapid population growth, industrialization, and agricultural expansion have intensified competition for water resources, placing unprecedented pressure on already constrained freshwater systems worldwide. Consequently, many countries are experiencing a deepening water crisis characterized by disrupted natural water flows, over-exploitation of water sources, and supply systems that are frequently unreliable, inadequate, and incapable of delivering continuous, affordable, and safe water services (Eliamringi & Kazumba, 2017; Saha et al., 2024; World Health Organization, 2025). Limited access to safe water remains a major public health risk factor, contributing to the prevalence of waterborne and infectious diseases such as cholera, dysentery, typhoid, hepatitis, and polio, particularly in developing countries (World Bank, 2018b; WHO, 2025)

These challenges are often compounded by governance deficiencies within the water sector. Conventional top-down management approaches have demonstrated limited effectiveness in monitoring, managing, and sustaining water supply systems at the community level (Global Water Parntership [GWP], 2012). In response, global policy and development discourse has increasingly shifted towards community-based approaches that emphasize stakeholder collaboration and local participation in the planning, management, monitoring, and evaluation of water supply projects (Dahal et al., 2019; Thapa et al., 2022; Theodory, 2022).

This paradigm shift is reflected in national policy and legal frameworks across many countries, which now promote the decentralization of water supply governance to community organizations. Such reforms are closely aligned with Sustainable Development Goal 6 (SDG 6), which aims to ensure universal, equitable, and affordable access to safe drinking water for all by 2030 (Martinsen, 2018; World Bank, 2018a, 2018b). International platforms and declarations—

including the International Conference on Freshwater (2001) and the Second and Third World Water Forums (2000, 2003)—have similarly endorsed community-based water resource management as a sustainable pathway for improving water access (GWP, 2012).

Community-Based Management (CBM) represents a participatory governance model designed to engage diverse stakeholders in the planning, implementation, and oversight of Community-Based Water Supply Projects (CBWSPs). Its central objective is to ensure that water services remain reliable, affordable, and adequate for both present and future generations (Chimbula & Massawe, 2018). Achieving this objective requires Community-Based Water Supply Organisations (CBWSOs) to adopt integrated management strategies that address the technical, financial, social, and environmental dimensions of sustainability (Komakech & Kwezi, 2020; Nti et al., 2021; Thapa et al., 2022).

A critical determinant of CBWSP success lies in the capacity of CBWSOs to foster active participation, institutional collaboration, and shared resource stewardship among stakeholders (Fierro et al., 2017; Guta et al., 2022; Kilonzo & George, 2017; Luvinga, 2025; Shields et al., 2021). Meaningful engagement between citizens, local governments, and sector actors across all stages of project implementation is widely regarded as fundamental to sustainable water service delivery (Ankon et al., 2022; Kasri et al., 2017).

Despite the recognized potential of community-based management, the long-term functionality and sustainability of CBWSPs remain constrained by persistent challenges, including limited institutional capacity, inadequate financial resources, and weak regulatory and policy support frameworks (Cronk & Bartram, 2017; Nti et al., 2019). As Devente et al. (2016) emphasize, clearly defined and operationalized participatory processes are essential for ensuring that CBWSPs achieve their intended service and development outcomes. Moreover, effective governance frameworks play a crucial role in enabling CBWSPs to co-create social value and enhance community resilience (Ojuri et al., 2023).

While the developmental benefits of community-based water supply initiatives are widely documented, significant gaps remain in the global understanding of governance structures underpinning these projects. In particular, limited scholarly attention has been devoted to synthesizing global research trends, collaboration networks, and thematic evolutions within CBWSP governance literature. Questions persist regarding how knowledge production in this field has evolved over time, which regions and institutions are most influential, and what thematic priorities have shaped governance discourse over time. Furthermore, there is a lack of comprehensive global assessments examining how CBWSOs navigate governance challenges and sustain water service delivery across diverse socio-institutional contexts.

Although existing studies have examined governance dimensions of Community-Based Water Supply Projects (CBWSPs) from case-specific and regional perspectives, the field has expanded rapidly and become increasingly fragmented across disciplines, regions, and methodological approaches. In such a dynamic knowledge landscape, conventional literature reviews are often insufficient to reveal the structural evolution of scholarship, patterns of intellectual collaboration, and emerging thematic concentrations that shape the field. A bibliometric review is therefore necessary to provide a systematic mapping of knowledge production, enabling the identification of influential authors, institutions, countries, citation networks, and research clusters. By uncovering how governance discourse in CBWSPs has evolved over time and where scholarly attention has been concentrated or neglected, bibliometric analysis offers a meta-analytical perspective that strengthens conceptual clarity, highlights research frontiers, and informs future empirical and policy-oriented investigations. Such an approach is particularly critical in governance studies, where interdisciplinary overlaps and contextual variability often obscure cumulative knowledge development.

Therefore, the present study undertakes a bibliometric review of global scholarship on community-based water supply project governance. Guided by the PRISMA framework, the study systematically identifies, screens, and analyses published literature to map publication trends, influential studies, leading authors, institutional and geographical research distributions, and emerging thematic areas. By synthesizing evidence from Africa, Asia, Europe, and the Americas, the review provides a comprehensive global perspective on participatory governance and management dynamics within community-based water supply initiatives.

1.2 Research Objectives

The study was guided by the following specific objectives

i. To analyze publication trends and the geographical and institutional distribution of global research on the governance of Community-Based Water Supply Projects (CBWSPs).
ii. To identify influential authors, journals, and publications, and to map collaboration networks among scholars, institutions, and countries engaged in CBWSP governance research.
iii. To examine the intellectual structure of the field by identifying major thematic clusters, emerging research themes, and existing knowledge gaps in CBWSP governance scholarship.

II. THEORETICAL REVIEW

2.1 Participatory Governance Theory

Participatory Governance Theory offers a valuable lens for understanding the governance of community-based water supply projects (CBWSPs). Rooted from the work the scholars such as Arnstein (1969), Oakley and Marsden (1984) and Pretty (1995), it is highlighted that participation exists along a continuum. According to Arnstein (1969), participation is conceptualized as a spectrum—from tokenistic involvement to genuine citizen control—highlighting the varying influence communities can exert over decision-making. Oakley and Marsden (1984), later expanded this idea through empowered participatory governance, emphasizing institutional arrangements that enable citizens, government agencies, and civil society actors to collectively deliberate and address shared challenges.

The theory posits that effective and sustainable service delivery depends on inclusive decision-making, transparency, and accountability (Rondinelli et al., 2007). Applied to CBWSPs, participatory governance suggests that involving multiple stakeholders—community organizations, local governments, NGOs, and development partners—enhances planning, implementation, monitoring, and maintenance of water systems (Agrawal & Ribot, 1999; Mompati & Prinsen, 2000). By integrating local knowledge and priorities, participatory arrangements foster legitimacy, responsiveness, and community ownership of water services (Edwards, 2013; Franks et al., 2013). The theory mull over the role of social and community capital in sustaining water supply projects (Brown & Ashman, 1996; Coleman, 1988). Beyond working with community organizations, local governments can take actions to develop and foster a sense of community and civic culture community power, and community values through community based organization's initiatives (Anselmi, 2021; Edwards, 2013; Goodman et al., 1998).

However, participatory governance faces practical limitations. Engagement may be symbolic rather than substantive, with limited influence on final decisions. Power imbalances, unequal access to information, and capacity gaps among community members can hinder meaningful participation (Kavina, 2018; Kolavalli & Kerr, 2002). Without institutional support, technical guidance, or financial backing, participatory mechanisms may fail to achieve sustainable outcomes (Harold & Smits, 2011; Harvey & Reed, 2007).

In the context of this bibliometric review, Participatory Governance Theory provides a conceptual framework for interpreting observed patterns in the literature, including stakeholder collaboration, multi-level governance arrangements, and community participation. It explains the growing emphasis on governance structures, institutional partnerships, and participatory mechanisms as key determinants of the sustainability and effectiveness of community-managed water services.

III. METHODOLOGY

The data collection for this study was conducted systematically using the PRISMA model a well-established and widely accepted framework for guiding systematic reviews. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) offers a transparent and structured approach for identifying, screening, and analyzing scholarly literature (Moher et al., 2009). Its application in this study was particularly appropriate, as it ensured a rigorous and unbiased selection of relevant studies, providing a solid methodological foundation for the review. The model was considered for its usefulness in facilitating collection of good quality literature for the review (Xiao & Watson, 2017).

The process began with a systematic search of scholarly publications within the Dimensions database, chosen for its extensive coverage of peer-reviewed journals and comprehensive indexing of literature related to community-based water supply projects. A set of keywords was employed to ensure the identification of a relevant publications to the study themes (Büchter et al., 2023). The keywords "Community-Based" "Community Managed" "Participatory Managed" "Water Supply Projects" "Water supply schemes" and "Rural Water Supply" were used to search within document titles and abstracts, ensuring a broad capture of relevant empirical studies. To refine the results and enhance specificity, the Boolean operator *AND* or were employed to combine the search terms effectively.

A total of 681 journal articles were initially retrieved for the preliminary review of titles and abstracts. The inclusion criteria restricted the study to journal articles published in English within a ten-year period, specifically from 2015 to 2024. This bibliometric review restricted analysis to peer-reviewed journal articles to ensure methodological rigour, data reliability, and analytical comparability. Journal publications undergo stringent expert review, enhancing the credibility and scientific validity of findings. They also provide standardised bibliometric metadata—such as author affiliations, keywords, abstracts, and citation records—essential for accurate mapping of co-authorship, citation networks, and thematic co-occurrence using tools such as VOSviewer. Excluding non-journal sources (e.g., reports, theses, and conference papers) minimises indexing inconsistencies and analytical bias. Consequently, focusing on journal articles enables robust capture of the field's core intellectual structure and scholarly evolution

The study adopted a ten-year publication timeframe (2015–2024) to capture contemporary research trends within the post-Sustainable Development Goals (SDG) era. The year 2015 marks a significant global policy milestone following the adoption of the United Nations 2030 Agenda and Sustainable Development Goal 6 (SDG 6), which

prioritises universal access to safe and affordable drinking water (World Bank, 2018b; WHO, 2025). Situating this bibliometric analysis within the 2015–2024 timeline enables an assessment of how research on community-based water supply governance has evolved in response to SDG-driven priorities, financing frameworks, and implementation strategies. Methodologically, the ten-year window balances temporal depth with analytical relevance, allowing robust mapping of publication trends, collaboration networks, and thematic developments aligned with contemporary policy debates.

Accordingly, 299 articles were excluded for falling outside this predefined timeframe. Additionally, 94 publications such as monographs, book chapters, editorials, and conference proceedings were removed from the dataset, as they did not meet the requirement of being peer-reviewed journal articles. The analysis of the titles and abstract, lead to further exclusion of 57 documents whose themes were not relevant to this study scope and/or not published in English language. This was in line to (Xiao & Watson, 2017) assertions that, any studies unrelated to the research questions(s) should be excluded. Following this screening process, 231 empirical journal articles qualified for final inclusion in the study. These articles formed the basis for an in-depth bibliometric review (see **Figure 1** and **Table 1**).

Initially, three researchers independently extracted relevant information from the selected articles. This individual effort was followed by collaborative discussions to reconcile differences and reach consensus on the extraction and summarization of key findings. As emphasized by (Xiao & Watson, 2017), it is essential for all reviewers to engage with the full text of articles rather than relying solely on abstracts or conclusions. The data, exported from the Dimensions database, were further analyzed using VOSviewer and Microsoft Excel. Microsoft Excel facilitated the organization and management of data, including details such as authorship, year of publication, country of origin, journal source, and thematic focus. VOSviewer (version 1.6.20), a powerful bibliometric software tool, was used to construct and visualize bibliometric networks. This tool enabled the clustering of related publications and the mapping of collaboration networks within the scope of the study, offering valuable insights into the landscape of research on community-based water supply projects.

VOSviewer's visualization tool was employed to map networks across several categories, including direct citation analysis, co-citation patterns, thematic clusters, and emerging research trends (Kleminski et al., 2020). These visualizations such as network, overlay, and density maps provided a comprehensive overview of the structure and dynamics of research in this field, particularly in developing countries. To ensure relevance and focus, terms included in the mapping were carefully filtered to highlight only the most significant patterns and trends.

This analytical approach also facilitated the identification of key publications, authors, and citation relationships among journals, institutions, and countries. Moreover, it enabled the recognition of the most influential organizations contributing to research on community-based water supply projects and highlighted opportunities for collaboration and joint research efforts.

Table 1

Inclusion and Exclusion Criteria

Sn	Inclusion Decision	Exclusion Decision
1	Focusing on community based water supply projects	Articles not focusing on Community Based Water Supply Projects
2	Only Peer-reviewed journal articles	All other studies which are not peer-reviewed journal articles including; proceedings, reports, monograph, Book chapters and editorials
3	Studies published in English language	Studies published in other languages
4	Only articles published within 10 years from 2015 to 2024	Studies published Before 2015 and after 2024

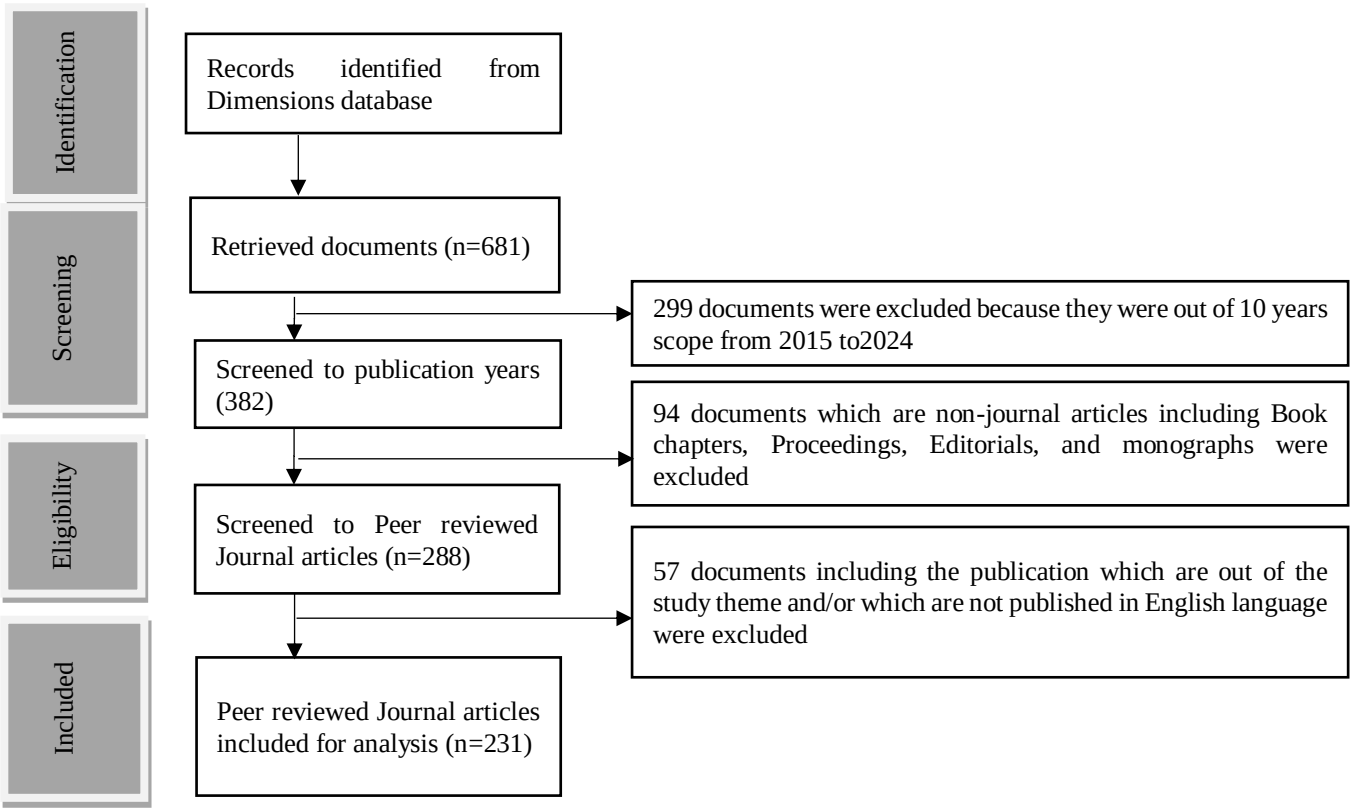

Figure 1
PRISMA Model Describing the Literature Search, Inclusion and Exclusion (Moher et al., 2009)

IV. FINDINGS & DISCUSSION

4.1 Findings

Key findings such as publication years, authorship patterns, geographical distribution, and thematic emphasis were systematically extracted and synthesized. This comprehensive bibliometric review not only provides a clear picture of the current state of scholarly work in the field but also identifies critical knowledge gaps and suggests directions for future investigations.

4.1.1 Yearly Distribution of Publication Output

A descriptive summary of findings was derived from a review of journal articles published between 2015 and 2024. The analysis reveals fluctuating trends in the number of publications related to community-based water supply projects over the ten-year period. By examining year-on-year publication data, the study offers valuable insights into the evolving research landscape surrounding the governance and sustainability of these projects. This trend analysis also suggests potential avenues for future research. A notable increase in scholarly interest occurred between 2015 and 2018. Specifically, publications rose from 10 in 2015 to 19 in both 2016 and 2017, reflecting an approximate 90% increase over two years. The upward trend continued in 2018, reaching 24 publications, an additional 26.3% increase from the previous year. However, a slight drop occurred in 2019, with the number of publications declining to 20, representing a 16.7% decrease from 2018.

Despite this decline, the general trajectory remained positive between 2019 and 2023. The number of publications gradually increased to 23 in 2020, 25 in 2021, and 28 in 2022, amounting to a growth of roughly 40% from 2020. The peak was reached in 2023 with 36 publications, the highest annual record during the study period. However, in 2024, the number of publications dropped to 27, indicating a 25% decline compared to 2023. As illustrated in

Figure 2, these fluctuations represent alternating periods of increasing and decreasing research interest in community-based water supply projects over the years.

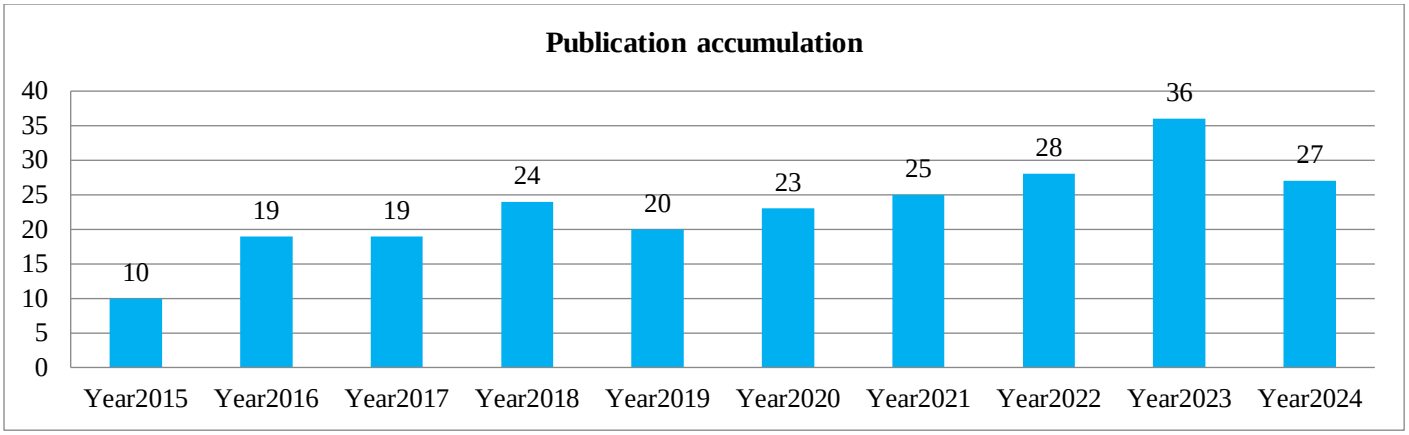

Figure 2
Publications Progress from 2015-2024

Overall, while the data shows variability, the general trend reflects sustained and growing scholarly engagement with the topic, especially in the context of governance and sustainability of CBWSPs. The recent decline in 2024 suggests the need for continued advocacy and investment in research to maintain momentum in this critical area of development.

4.1.2 Visualization of co-authorship and organization

The visualization of the relationship between co-authorship and organizations was conducted using VOSviewer. The analysis was configured with a minimum threshold of two co-authorship links and at least 25 citations per organization. Applying these criteria resulted in 13 organizations, which were grouped into four distinct collaboration clusters, reflecting the major institutional networks contributing to research on community-based water supply projects (CBWSPs).

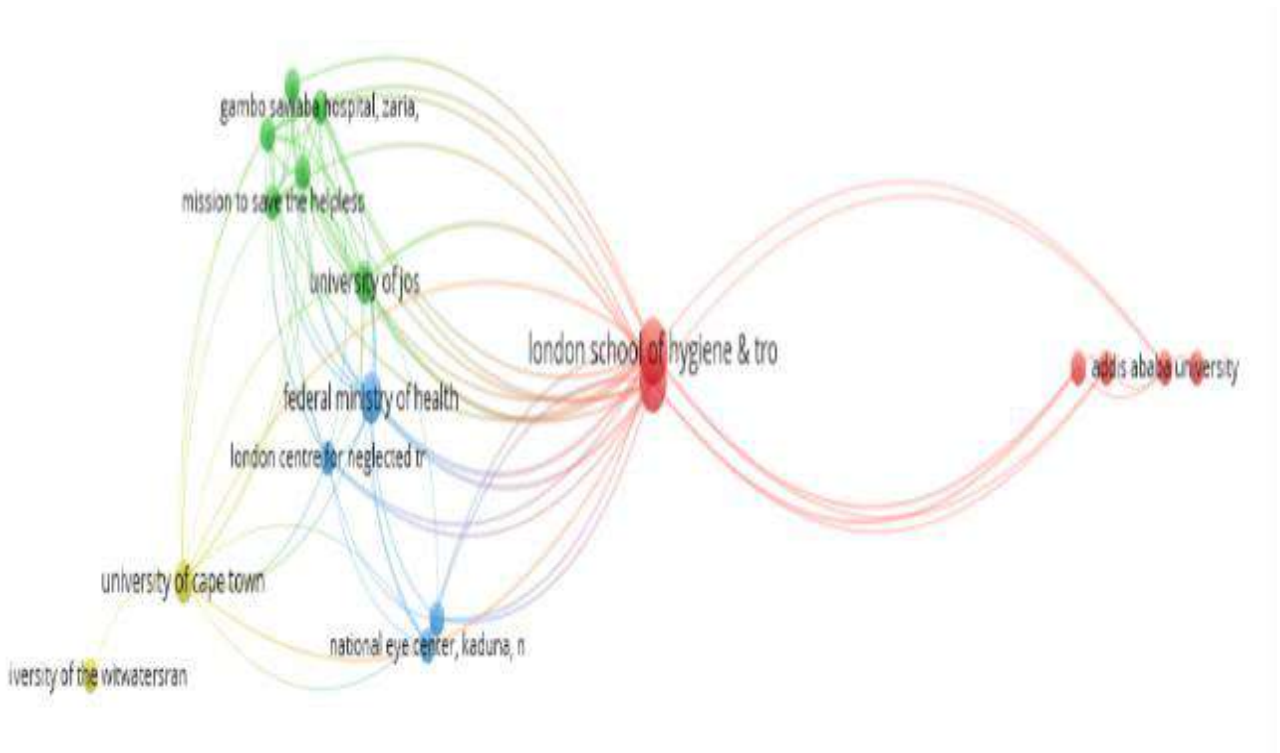

Figure 3
The Visualization of Co-Authorship and Organizations

The first cluster, represented in red (**Figure 3**), comprises six organizations: Addis Ababa University, Johns Hopkins University, London School of Hygiene and Tropical Medicine, Sight Savers, The Task Force for Global Health, and the University of British Columbia. This cluster is characterized by collaboration between globally recognized universities and international non-governmental organizations. The prominence of these institutions suggests a strong

global research leadership in the governance and management of community-based service delivery systems, including water supply initiatives. Their collaborative engagement reflects the integration of academic research, global health programmes, and development interventions in shaping governance discourse related to community-managed infrastructure.

The second cluster, visualized in green, also includes six organizations: Gambo Sawaba Hospital (Zaria), Mission to Save the Helpless, National Eye Centre, Sight Savers – Nigeria Country Office, University of Jos, and Usmanu Danfodiyo University. This network represents a regionally grounded collaboration between health institutions, universities, and local development organizations. The composition of this cluster suggests a focus on operational and service-delivery dimensions of community-based interventions, particularly where water access intersects with community health outcomes. From a governance perspective, this cluster highlights the importance of local institutional partnerships and context-specific knowledge in addressing service delivery challenges at the community level.

The third cluster, depicted in blue, consists of four organizations: the Federal Ministry of Health, the London Centre for Neglected Tropical Diseases, the National Eye Centre – Kaduna, and Sight Savers – Kaduna, Nigeria. This grouping can be characterized as a "policy–research–service delivery nexus", illustrating collaboration between governmental authorities, specialized research centres, and implementing institutions. Such relationships reflect the role of multi-level governance arrangements, where policy institutions, research bodies, and operational agencies interact to generate evidence, design interventions, and deliver services within community-based development programmes.

The fourth cluster, represented in orange, includes two institutions: the University of Cape Town and the University of the Witwatersrand. Despite the smaller number of organizations, this cluster highlights the regional scholarly contribution from leading African universities, particularly from South Africa. Their presence within the network demonstrates the growing role of African research institutions in advancing scholarly debates on community-based resource management and sustainability.

Overall, the visualization and mapping analysis reveal interconnected collaborative networks among universities, research centres, governmental bodies, and non-governmental organizations engaged in research related to community-based water supply management. The clustering structure illustrates how different types of institutions contribute distinct yet complementary roles in the governance landscape—ranging from knowledge production and policy formulation to programme implementation and service delivery.

Importantly, the analysis also indicates that institutions from both developed and developing countries participate in the research domain. However, the network visualization suggests that organizations from developed countries occupy relatively central positions in terms of citation influence and research leadership. This pattern reflects broader structural inequalities in global knowledge production, where institutions in the Global North often possess greater access to research funding, publication platforms, and international collaboration networks.

Addressing this imbalance requires deliberate efforts to strengthen equitable research partnerships and institutional capacity in developing regions. This may involve targeted capacity development programmes, expanded international research collaborations, increased investment in locally driven research initiatives, and supportive policy frameworks that facilitate technology transfer and knowledge exchange. Enhancing these dimensions of collaboration is essential for fostering more inclusive global research networks and for ensuring that evidence informing the governance of community-based water supply systems adequately reflects the realities and priorities of communities in the Global South.

4.1.3 Co-Authorship vs Countries

The analysis of co-authorship by country was conducted using a minimum threshold of three documents per country. Using VOSviewer, the analysis identified 32 countries that met the threshold and were grouped into eight collaboration clusters, as illustrated in **Figure 4**. The first cluster comprised eight countries: Costa Rica, India, Italy, Japan, Peru, Romania, Spain, and Switzerland. The second cluster included Kenya, Nigeria, South Africa, the United Kingdom, the United States, and Zimbabwe. The third cluster consisted of Bangladesh, Canada, Ghana, and Sweden. The fourth cluster included China, Indonesia, Malaysia, and the Netherlands. The fifth cluster comprised Cameroon, Germany, and Poland, while the sixth cluster included France, Nepal, and Vietnam. The seventh cluster was formed by Australia and Chile, whereas the eighth cluster consisted of Ethiopia and Finland. These clusters reflect collaborative research networks that connect countries across different geographic regions and development contexts.

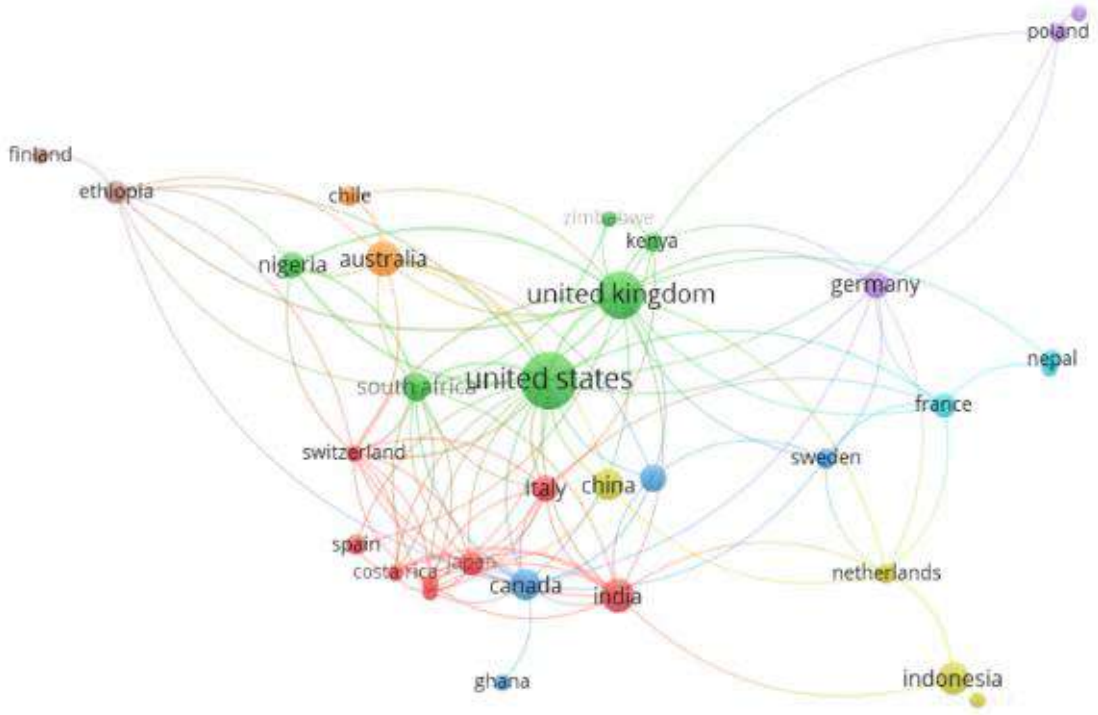

Figure 4
Network Visualization between Co-Authorship and Countries

The co-authorship network demonstrates notable patterns of collaboration between developed and developing countries in research on community-based water supply projects (CBWSPs). Countries such as the United States, the United Kingdom, Germany, Australia, France, the Netherlands, Japan, Canada, Sweden, and Switzerland exhibit extensive co-authorship linkages, indicating strong participation in global research networks. These countries typically possess advanced research infrastructure, greater access to funding, and well-established international partnerships, which enable them to assume central roles in knowledge production and dissemination. In contrast, developing countries—including Kenya, South Africa, Ethiopia, Nigeria, India, Nepal, Ghana, Indonesia, and Zimbabwe—also participate in collaborative research, although their contributions often occur within regional or partnership-based networks that involve institutions from the Global North.

From the perspective of Stakeholder Theory, the observed co-authorship networks can be interpreted as a reflection of multi-stakeholder engagement in the generation of knowledge on water governance. Research collaboration across countries represents interactions among diverse stakeholders—including universities, governments, international organizations, and development agencies—who share an interest in improving access to safe and sustainable water services. These collaborative relationships enable the pooling of expertise, resources, and institutional capacities necessary to address complex water governance challenges, particularly in contexts where community-managed systems play a critical role in service delivery.

Similarly, the Community Participation Framework provides an important lens for interpreting these findings. Community-based water supply projects rely heavily on participatory governance structures, where local communities, government authorities, and external partners jointly contribute to planning, implementation, and management processes. The observed international co-authorship patterns mirror this participatory approach at the research level, where collaborative partnerships facilitate the co-production of knowledge relevant to community water management. Such knowledge exchange is particularly valuable for understanding local contexts, strengthening institutional capacity, and designing inclusive governance models that empower community stakeholders in decision-making processes.

Despite the growing collaborative engagement between developed and developing countries, the network visualization reveals a persistent disparity in research influence. Among the countries with the highest co-authorship link strengths, the majority are developed nations. This pattern reflects broader structural inequalities in global research systems, where institutions in developed countries often have greater access to funding opportunities, advanced research facilities, and established academic publishing platforms. Consequently, these countries tend to dominate global research agendas and thematic leadership in areas such as participatory water governance and sustainable community-based infrastructure management.

Nevertheless, the increasing participation of countries beyond the traditional research hubs of the United Kingdom and the United States indicates an encouraging shift towards more inclusive global research collaboration. Emerging partnerships involving countries in Africa, Asia, and Latin America suggest a gradual expansion of knowledge networks aimed at addressing the sustainability challenges of community-based water supply systems in the Global South. Strengthening these collaborations is essential for promoting equitable knowledge exchange and ensuring that research reflects the lived realities of communities managing water systems at the local level.

To further enhance collaborative research and knowledge production, there is a need for targeted initiatives that support capacity development in developing countries. Such initiatives may include increased research funding, expanded training programmes, technology transfer mechanisms, and stronger institutional partnerships between universities, governments, and development organizations. By fostering inclusive and participatory research networks, these efforts can contribute to more balanced global knowledge systems and ultimately support the sustainable governance of community-based water supply projects.

4.1.4 Citation vs Sources of Data/Journals

The VOSviewer co-citation analysis, conducted using a minimum threshold of 25 citations per journal, identified 39 sources grouped into six thematic clusters (**Figure 5**).The network visualization illustrates the citation landscape across journals addressing themes related to the governance of community-based water supply projects (CBWSPs), with particular emphasis on water resources, hydrology, environmental management, climate change, and sustainability. Several journals occupy central and highly influential positions within the network, including Science of the Total Environment, Water, Water Resources Research, Nature, Water Research, and the Journal of Hydrology. Their prominence is reflected in larger node sizes and dense citation linkages, indicating that these outlets serve as key platforms for disseminating research related to water resources and environmental systems that underpin community-based water supply governance.

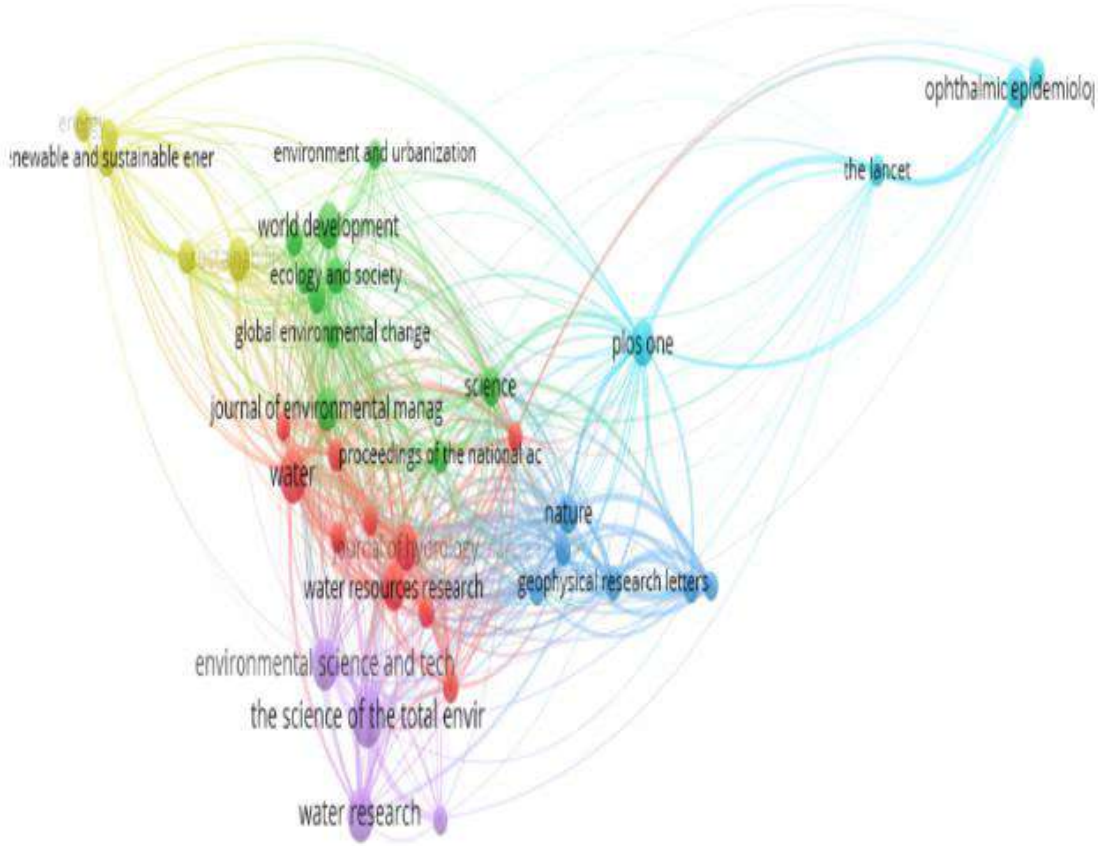

Figure 5
The Relationships between different Journals and how frequently they are cited

The first cluster comprises ten journals primarily focused on hydrology and water resource systems, including Agricultural Water Management, Hydrogeology Journal, Hydrological Processes, Hydrology and Earth System

Sciences, Journal of Hydrology, Physics and Chemistry of the Earth, Scientific Reports, Water, Water Resources Management, and Water Resources Research. This cluster represents the technical and hydrological knowledge base that informs the design, operation, and sustainability of water supply systems. From a governance perspective, these journals contribute essential scientific insights regarding water availability, watershed processes, groundwater dynamics, and resource management. Such knowledge forms the scientific foundation upon which policy decisions and community-based water management strategies are often developed.

The second cluster includes journals that emphasize social, economic, and policy dimensions of environmental governance. These sources include Ecological Economics, Ecology and Society, Environment and Urbanization, Global Environmental Change, Journal of Environmental Management, Proceedings of the National Academy of Sciences, Science, Water International, Water Policy, and World Development. In contrast to the hydrology-focused cluster, this group reflects scholarship that examines institutional arrangements, governance structures, policy frameworks, and socio-economic dynamics associated with water resource management. The presence of these journals highlights the growing recognition that sustainable community-based water supply systems depend not only on technical infrastructure but also on inclusive governance mechanisms, stakeholder participation, and effective institutional coordination.

The third cluster consists of journals such as Biogeosciences, Geophysical Research Letters, Limnology and Oceanography, Nature, Nature Climate Change, and Nature Communications. These journals focus on broader environmental and climate science research. Their clustering indicates the importance of climate variability, ecosystem processes, and environmental change in shaping water resource sustainability. These studies provide critical evidence regarding climate risks, environmental degradation, and ecological resilience—factors that directly influence the governance and long-term viability of community-managed water systems.

The fourth cluster comprises journals related to sustainability transitions and resource efficiency, including Energy, Energy Research & Social Science, Journal of Cleaner Production, Renewable and Sustainable Energy Reviews, and Sustainability. Although these journals are primarily associated with energy and sustainability studies, their presence in the citation network suggests increasing scholarly attention to integrated resource governance and sustainable development frameworks. This reflects the recognition that water governance is interconnected with broader sustainability transitions involving energy systems, environmental protection, and climate adaptation strategies.

The fifth cluster includes journals such as Environmental Health Perspectives, Environmental Science & Technology, Science of the Total Environment, and Water Research. These outlets bridge environmental science and public health by examining the water–health nexus, including issues related to water quality, pollution, sanitation, and environmental exposure risks. In the context of community-based water supply governance, this cluster underscores the critical link between water management practices and public health outcomes. Evidence generated in these journals informs regulatory standards, monitoring practices, and institutional responses aimed at safeguarding community health through improved water quality management.

The sixth cluster is composed of journals primarily focused on health and neglected tropical diseases (NTDs), including Ophthalmic Epidemiology, PLOS Neglected Tropical Diseases, PLOS ONE, and the Lancet. The prominence of these journals indicates that research on community-based water supply systems is often closely linked to public health interventions, particularly in regions where water-related diseases remain prevalent. The dominance of health-oriented journals in this cluster suggests that governance research in this field is frequently framed through the lens of disease prevention and health service delivery. This reflects the practical reality that improvements in water access and sanitation are central components of global health initiatives aimed at controlling diseases such as trachoma and other water-related infections. Consequently, public health institutions and medical research communities play a significant role in shaping research agendas related to community water governance.

The clustering pattern also reveals a notable separation between environmental and technical journals (Clusters 1 and 3) and social science and policy-oriented journals (Cluster 2). This separation reflects the broader disciplinary structure of water research, where scientific and engineering studies often focus on hydrological processes and technological solutions, while social science scholarship examines governance arrangements, institutional dynamics, and community participation. Although these bodies of literature address complementary aspects of water management, the network structure suggests that they remain partially fragmented. Bridging this divide is essential for advancing integrated governance approaches that combine technical innovation with participatory decision-making and institutional accountability.

Overall, the co-citation network highlights the highly interdisciplinary nature of research on community-based water supply governance. The interaction between hydrological sciences, environmental management, public health, sustainability studies, and policy research reflects the complex challenges associated with managing water systems at the community level. By mapping these citation relationships, the analysis identifies influential journals and intellectual domains that shape scholarly debates in this field. These insights are valuable for researchers, practitioners, and policymakers seeking to strengthen governance frameworks that support the sustainability and resilience of community-based water supply projects.

4.1.5 Citation Based on Key Terms Co-Occurrence

The VOSviewer overlay visualisation provides a comprehensive bibliometric mapping of key terms that frequently co-occur in the literature on community-based water supply schemes. Co-occurrence analysis helps identify dominant research themes and conceptual relationships within a field of study. In this analysis, the visualization reveals four major thematic clusters, each representing a distinct but interrelated area of scholarly focus relevant to the governance and sustainability of community-based water supply projects (CBWSPs). A summary of these clusters is presented in **Figure 6**.

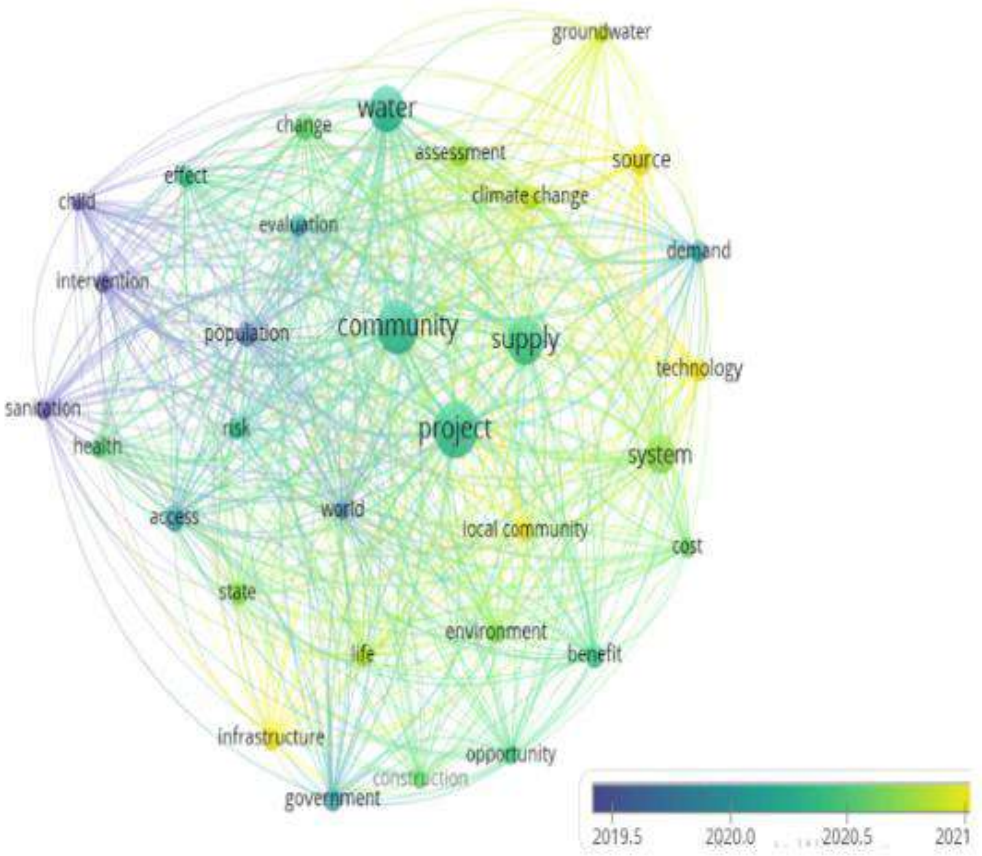

Figure 6
Network Visualization of Key Terms Co-Occurrence

The first cluster consists of eleven key terms, including access, change, effect, evaluation, health, intervention, population, risk, sanitation, and world. Collectively, these terms highlight the strong connection between water access, sanitation services, and public health outcomes. The prominence of concepts such as evaluation, intervention, and risk suggests that a significant portion of the literature emphasizes the monitoring and assessment of water supply interventions aimed at improving community health and well-being. From a governance perspective, this cluster underscores the importance of evidence-based decision-making and accountability mechanisms in CBWSPs. Effective governance structures rely on systematic monitoring and evaluation to ensure that water supply interventions achieve their intended outcomes and mitigate health risks associated with inadequate water and sanitation services. Furthermore, within the framework of Participation Theory, the focus on community health and service delivery implies the need for active involvement of local populations in identifying challenges, evaluating project performance, and contributing to decision-making processes that affect their access to safe water.

The second cluster focuses on climate change and environmental sustainability, encompassing ten prominent terms: assessment, climate change, community, demand, groundwater, project, source, supply, water, and system. These terms reflect increasing scholarly attention to the environmental dimensions of water resource management and the need to strengthen resilience in community-based water systems. Climate variability and environmental degradation pose significant threats to the sustainability of water sources, particularly in rural and resource-constrained settings where CBWSPs are commonly implemented. Within the context of governance, this cluster highlights the importance of adaptive management strategies that integrate environmental assessments, sustainable resource planning, and community engagement. The inclusion of the terms community and demand further emphasises that sustainable water

governance must incorporate local knowledge and user participation in the planning and management of water systems. Participation Theory suggests that involving community members in decision-making processes enhances local ownership and strengthens the capacity of communities to manage water resources in the face of environmental uncertainties.

The third cluster centres on institutional and governance-related concepts, including construction, environment, government, infrastructure, life, and state. This grouping reflects the role of formal institutions and public authorities in supporting the development and management of water supply infrastructure. The presence of terms such as government and state highlights the importance of institutional frameworks and policy environments in shaping the governance of CBWSPs. From the perspective of Stakeholder Theory, governments, regulatory agencies, and public institutions represent key stakeholders responsible for establishing enabling policies, allocating resources, and ensuring oversight of water supply initiatives. Their involvement is essential for providing technical support, regulatory guidance, and long-term sustainability mechanisms for community-managed water systems. At the same time, effective governance requires coordination between state actors and local communities to ensure that infrastructure development aligns with community needs and environmental considerations.

The fourth cluster includes terms such as benefits, costs, local community, opportunity, and technology. This cluster emphasises the socio-economic implications of community-based water supply initiatives and the central role of local communities in determining project outcomes. The presence of both benefits and costs indicates that water supply interventions generate diverse impacts that can either enhance community welfare or create unintended burdens if poorly designed or managed. The inclusion of technology further highlights the importance of selecting appropriate and context-sensitive technologies that align with local capacities and environmental conditions. Within the frameworks of Participation Theory and Stakeholder Theory, local communities are not merely passive beneficiaries of water supply projects but active stakeholders whose engagement is critical to project sustainability. Their participation in technology selection, management structures, and operational decision-making helps ensure that water systems remain functional, socially accepted, and responsive to community needs.

Overall, the co-occurrence network demonstrates that research on community-based water supply schemes is inherently interdisciplinary, encompassing public health, environmental sustainability, institutional governance, and socio-economic considerations. The interconnections among these thematic clusters illustrate how effective governance of CBWSPs requires collaboration among multiple stakeholders, including governments, local communities, researchers, and development partners. By mapping these conceptual relationships, the bibliometric analysis not only identifies dominant research themes but also highlights the importance of participatory governance approaches that integrate technical, institutional, and community perspectives in the sustainable management of community-based water supply systems.

4.2 Discussion

The bibliometric evidence provides important insights into the evolution, structure, and thematic orientation of scholarship on community-based water supply projects (CBWSPs). Viewed through the lens of stakeholder theory, the steady expansion of publications reflects growing recognition that sustainable water governance depends on the alignment of interests, roles, and accountability mechanisms among multiple actors, including local communities, governments, donors, non-governmental organizations, and technical agencies. The post-2015 surge in publications coincides with global policy shifts emphasizing inclusive and participatory water governance under Sustainable Development Goal 6 (SDG 6), which calls for universal and equitable access to safe water. This trend reinforces the theoretical proposition that effective water service delivery increasingly depends on multi-stakeholder collaboration and shared governance arrangements. Within this framework, CBWSPs represent institutional platforms where communities, state institutions, and development partners collectively negotiate responsibilities for infrastructure management, financing, and service provision (Aashiq et al., 2022; Alam, 2022; Edwards, 2013; Nti et al., 2019; Reed et al., 2018). The apparent decline in publications in 2024 is therefore unlikely to reflect reduced scholarly interest, but rather cyclical publication dynamics, database indexing delays, or shifts in research funding priorities. Nevertheless, such fluctuations highlight the continued dependence of CBWSP research on international development agendas and donor-supported research initiatives.

The co-authorship and organizational mapping further reveal structural asymmetries within the global research ecosystem. Institutions from the Global North occupy central brokerage positions within collaborative networks, often shaping research agendas and epistemic authority, even though the implementation of CBWSPs largely occurs in the Global South. From the perspective of stakeholder theory, this pattern reflects unequal distribution of resources, research capacity, and decision-making influence among actors. At the same time, community participation frameworks emphasize that inclusive governance requires the active involvement of local actors not only in project implementation but also in knowledge production and policy dialogue. The clustering of African health institutions and service organizations indicates that CBWSP research is frequently embedded within applied public health and sanitation programmes rather than being framed primarily as water governance scholarship. This applied orientation partly

explains the strong focus on operational service delivery and health outcomes observed in the literature (Dahal et al., 2019; Falk et al., 2022; Thapa et al., 2022). Strengthening institutional leadership in the Global South and promoting equitable research partnerships is therefore essential for aligning scholarly production with participatory governance principles and for ensuring that research agendas reflect the realities of community-managed water systems.

Country-level collaboration patterns reinforce these asymmetries while simultaneously revealing emerging opportunities for more balanced knowledge exchange. Although North–South partnerships facilitate access to research funding, methodological expertise, and technological innovations, they may also reproduce structural dependencies if collaboration remains unidirectional. However, the growing visibility of South–South and triangular collaborations suggests a gradual reconfiguration of the global research landscape. Partnerships involving African, Asian, and Latin American institutions indicate increasing efforts to contextualize governance scholarship within local socio-cultural, environmental, and institutional realities. Such developments align with participatory development principles, which emphasize the importance of locally embedded knowledge systems in designing and sustaining community-managed water infrastructure (Anselm, 2022).

The journal and citation source analysis further illustrates the interdisciplinary foundation of CBWSP scholarship. Highly cited journals span hydrology, environmental science, climate research, public health, and sustainability studies. This disciplinary diversity reflects the complex socio-ecological nature of community water supply projects, which operate at the intersection of environmental processes, public health outcomes, technological infrastructure, and institutional governance arrangements. From the perspective of polycentric governance theory, this diversity is unsurprising. Polycentric governance emphasizes the existence of multiple centres of authority operating at different scales—community organizations, local governments, national regulatory agencies, and international development partners—each contributing to the management of shared resources. The interdisciplinary citation network therefore reflects the need for integrated knowledge systems capable of addressing the technical, institutional, and environmental dimensions of water governance simultaneously.

Keyword co-occurrence analysis provides further insights into the thematic evolution of the field. The prominence of health, sanitation, and risk-related terms highlights the historical framing of community-based water supply initiatives as public health interventions aimed at reducing waterborne diseases and improving sanitation outcomes. Earlier rural water programmes, which often prioritized infrastructure provision with limited community engagement, have been criticized for their limited sustainability (Allegretti & Greene, 2022). In response, contemporary scholarship increasingly emphasizes participatory governance mechanisms that strengthen community ownership, accountability, and local decision-making. At the same time, the growing visibility of climate change, groundwater management, and system sustainability terms reflects a broader shift toward environmental resilience and long-term resource security (Mahoo et al., 2015). Climate variability and declining groundwater availability present emerging governance challenges that require adaptive management strategies integrating community participation with scientific monitoring and regulatory oversight.

Governance- and infrastructure-related keywords also highlight the continued importance of state institutions in enabling or constraining the effectiveness of community-managed water systems. While decentralization reforms initially promoted community ownership as a pathway to sustainability, empirical evidence increasingly suggests that community management alone is insufficient without supportive institutional environments. Instead, the literature points toward hybrid governance arrangements in which community organizations manage day-to-day operations while state institutions provide regulatory oversight, technical support, and financial backstopping(Daniel et al., 2023; Haule, 2019; Ibrahim, 2017; Kayaga et al., 2019; Kilonzo & George, 2017; Machado et al., 2019). Such arrangements closely resemble polycentric governance systems where multiple actors share authority and responsibility for resource management.

The cluster linking costs, benefits, technology, and local community underscores a growing emphasis on the techno-economic dimensions of CBWSP sustainability. This indicates that contemporary debates are moving beyond normative discussions of participation towards practical considerations of financial viability, affordability, and lifecycle management of CBWSPs. Technology selection has emerged as a particularly critical determinant of system sustainability, influencing operational reliability, maintenance requirements, and community acceptance of water supply infrastructure (Cronk & Bartram, 2017; Daniel et al., 2023; Komakech & Kwezi, 2020). From a stakeholder perspective, technology choices must therefore be conferred among engineers, policymakers, and community users to ensure that systems remain both technically appropriate and socially acceptable.

Taken together, the bibliometric evidence portrays CBWSP research as an expanding but structurally uneven field, characterized by rising publication output, strong interdisciplinary integration, and intensifying global collaboration. However, persistent inequalities in research leadership, funding access, and knowledge production capacity remain evident. The findings provide valuable insights into the research landscape of community-based water supply projects (CBWSPs), highlighting both progress made and persistent challenges in ensuring access to clean and safe water. Addressing these imbalances will require deliberate investment in southern research institutions, promotion of equitable partnerships, and support for locally led scholarship.

Importantly, the bibliometric synthesis also reveals several critical knowledge gaps that warrant greater scholarly attention. Compared with technical and health-oriented research, relatively limited attention has been devoted to longitudinal governance analyses, power relations within community water institutions, gendered participation dynamics, and accountability mechanisms within community-based water supply organizations (CBWSOs). Future research should therefore prioritize theory-driven governance modelling, comparative cross-regional institutional analyses, participatory financing mechanisms, tariff governance, and climate-resilient community water governance frameworks. Methodologically, greater inclusion of locally embedded and practice-oriented research approaches will be necessary to rebalance epistemic authority and strengthen the relevance of scholarship to real-world governance challenges.

Overall, the findings highlight the need for more integrative and interdisciplinary research that addresses the financial, institutional, environmental, technical, and social dimensions of CBWSP sustainability. They reinforce the potential of community-based water supply systems to significantly improve access to safe water and enhance socio-economic well-being when supported by effective governance structures (Daluwatte & Sivakumar, 2018). Implementing participatory governance frameworks that strengthen stakeholder accountability, leadership capacity, and technical support mechanisms is therefore essential for ensuring the long-term sustainability of community water systems (Ananga et al., 2020). In line with the objectives of SDG 6, governments should prioritize policies that strengthen research infrastructure, promote equitable collaboration, support institutional capacity development, and facilitate evidence-based policy implementation for the sustainable management of community-based water supply projects (Mfinanga & Kaswamila, 2014; URT, 2019; World Bank, 2018b).

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This bibliometric review mapped the intellectual structure and development of global scholarship on the governance of community-based water supply projects between 2015 and 2024. The analysis reveals a rapidly expanding and highly interdisciplinary research field shaped by collaborations across environmental science, water resources management, public health, and sustainability studies. Citation networks and journal clustering indicate that governance discussions are frequently embedded within broader debates on water security, climate resilience, and environmental sustainability. At the same time, keyword co-occurrence patterns demonstrate that the literature is largely organized around several dominant thematic domains, including water access and public health, climate and environmental resilience, institutional and infrastructural governance, and community participation.

However, the bibliometric evidence also highlights several structural gaps in the current knowledge base. First, the geographical distribution of research remains uneven. Despite the fact that community-managed water systems are most prevalent in developing regions, particularly in Sub-Saharan Africa and parts of Asia and Latin America, scholarly leadership and publication outputs remain concentrated within institutions in the Global North. Second, the thematic structure of the literature suggests the persistence of disciplinary silos. Research on governance, technological innovation, environmental sustainability, and health outcomes often develops in parallel rather than through integrated analytical frameworks, limiting the ability of scholarship to capture the complex socio-institutional dynamics that shape the sustainability of community-based water supply projects.

Addressing these gaps requires stronger interdisciplinary collaboration and greater inclusion of empirical research from underrepresented regions where community-managed water systems play a central role in rural service delivery. Future studies should prioritize comparative and longitudinal governance analyses that examine institutional arrangements, financing mechanisms, stakeholder participation, and technological adaptation over time. Strengthening such integrative research will contribute to a more balanced global knowledge base and provide more robust evidence to guide policy and practice aimed at improving the sustainability and effectiveness of community-based water supply governance.

5.2 Recommendations

This paper recommends that, efforts should be strengthened to enhance research leadership and knowledge production capacity in the Global South. Governments, universities, and development partners should invest in research infrastructure, training, and funding mechanisms that enable scholars from regions where community-managed water systems are most prevalent to play a more prominent role in shaping research agendas and policy discourse. Promoting equitable North–South and South–South collaborations will help ensure that scholarship on community-based water supply governance better reflects local institutional realities and community experiences on Community based water supply projects.

Future studies should adopt more integrative and interdisciplinary research approaches that bridge existing thematic silos across water governance, public health, environmental sustainability, and technological innovation. In particular, scholars should prioritize comparative and longitudinal analyses that examine institutional arrangements,

stakeholder participation, financing mechanisms, and technological adaptation, thereby generating a more comprehensive understanding of the socio-ecological dynamics influencing the sustainability of community-based water supply projects.

Lastly, the policymakers and development agencies should strengthen hybrid and polycentric governance arrangements that combine community management with sustained institutional support from public authorities. This includes reinforcing regulatory oversight, technical assistance, financial backstopping, and inclusive governance mechanisms that address issues such as gender participation, accountability within Community-Based Water Supply Organisations (CBWSOs), and participatory tariff systems. Strengthening these governance frameworks will improve the long-term functionality and resilience of community-managed water services and support progress toward universal access to safe water under Sustainable Development Goal 6.

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