

Water Management in Sustainable Tourism: A Bibliometric Analysis

Loso Judijanto¹, Rini Fitrianingrum²

¹IPOSS Jakarta, Indonesia

²STIE Triguna Tangerang

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ABSTRACT

The current study seeks to examine the intellectual structure and evolution of water management as a part of the sustainable tourism research domain via bibliometric analysis approach. Based on publication data obtained from the scientific database and further analyzed using VOSviewer software, the study analyzes patterns of co-authorship, keywords' co-occurrences, thematic clustering, and citation performance in order to determine major trends and knowledge structure within the research domain. As the results show, sustainable development is identified as the main conceptual core of the domain, which tightly connects tourism, environmental sustainability, and water management. Key thematic clusters cover water resources management, ecotourism and ecosystem services, environmental degradation and pollution, as well as geoinformatics techniques like GIS and remote sensing. It was also discovered that over time there has been a shift from publications on environmental impacts and pollution towards more recent studies focused on water governance, adaptation to climate change and sustainable technological solutions. As for the pattern of cooperation, the field can be described as internationally connected but at the same time imbalanced, with several countries and organizations dominating in knowledge production.

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Corresponding Author:

Name: Loso Judijanto

Institution: IPOSS Jakarta, Indonesia

Email: losojudijantobumn@gmail.com

1. INTRODUCTION

Tourism has emerged as one of the key economic sectors around the world due to its large contribution to job creation and regional growth, along with economic development across the globe. International tourism has been growing very rapidly over the last decades, according to the United Nations World Tourism Organization, and tourism destinations have come to depend heavily on natural resources for maintaining

their competitive advantages [1], [2]. Water is one of the natural resources that play a crucial role in enabling tourism operations, such as accommodation facilities, recreation, transport, sanitation, landscaping, and food provision. The larger the number of tourists is, the more water is needed by tourism destinations [3], [4].

Water management is becoming increasingly essential for sustainable tourism development owing to the fact that tourism

practices tend to put much stress on the water resources in the locality. Hotels, resorts, golf courses, and swimming pools are among tourism establishments that require a lot of fresh water. This problem becomes even more acute in locations where there is already water shortage. In many destinations, tourism is competing against the local population and industry for the limited amount of water available in the area. Prior research suggests that water shortages and consumption of water by tourists could become an impediment for successful tourism development [5]–[7].

In light of these concerns, research interest in water management in the tourism sector has increased substantially during the last two decades. Academics from various fields of study, including but not limited to tourism, environmental science, sustainability science, geography, and resource management, have conducted studies related to the interrelation of water and tourism [8]–[10]. Published works have covered such issues as patterns of water use in hotels, water footprint, sustainable destination management, climate adaptation, stakeholder involvement, governance models, and the application of principles of circular economy to tourism. An increasing number of publications shows the awareness that effective water management is a prerequisite for the development of sustainable tourism and fulfillment of the UN Sustainable Development Goals, especially Goals 6 (Clean Water and Sanitation) and 12 (Responsible Consumption and Production) [11], [12].

In spite of the large amount of literature on the issues of water management and sustainable tourism, the structural framework, evolution of topics, and trends of research in this area have not been analyzed coherently and sufficiently enough. Individual papers tend to concentrate on certain geographic areas, tourism industry branches, or particular ways of management, which hinders getting a comprehensive view of the development of the area of study. In addition, there are new areas of interest in this sphere such as water resilience, climate change adaptation, innovative approaches to

water management, creation of circular water systems, and sustainable destination governance that are developing rapidly. Hence, bibliometric analysis becomes a useful tool for structuring scientific knowledge, identifying key scientific papers, detecting collaboration networks, and finding out the emerging areas of research. Bibliometric techniques have been successfully used for the analysis of research developments in many spheres of sustainability, allowing to learn about the structure and evolution of scientific fields [13]. Thus, the bibliometric analysis of water management in sustainable tourism becomes necessary.

Even though the body of scientific literature on water management in sustainable tourism has grown dramatically in recent years, currently no thorough bibliographic studies have been conducted which would provide a systematic mapping of the intellectual structure of this research area, the evolution of themes, prominent researchers and emerging trends in it. The existing literature reviews deal exclusively with some particular dimensions of the problem under consideration, thereby leaving much to be desired regarding the comprehensive knowledge about its scientific development. Scholars and practitioners thus encounter difficulties in understanding the dominating research topics, collaboration patterns, knowledge gaps and areas for further research in this field. This gap demonstrates the necessity of conducting a bibliometric study which would help to gain an overall insight into the scientific literature on water management in sustainable tourism. This paper attempts to conduct a bibliometric study of scientific development of water management research in sustainable tourism.

2. METHODS

The bibliometric analysis methodology was used in this paper to study the development, structure, and trends in research on water management in sustainable tourism. This is a numerical technique used to analyze scientific works and to detect trends in scientific literature by means of statistics

environmental monitoring techniques in the sustainable tourism water governance, while

the conceptual core remains focused on sustainability and tourism development.

3.2 Co-Authorship Analysis

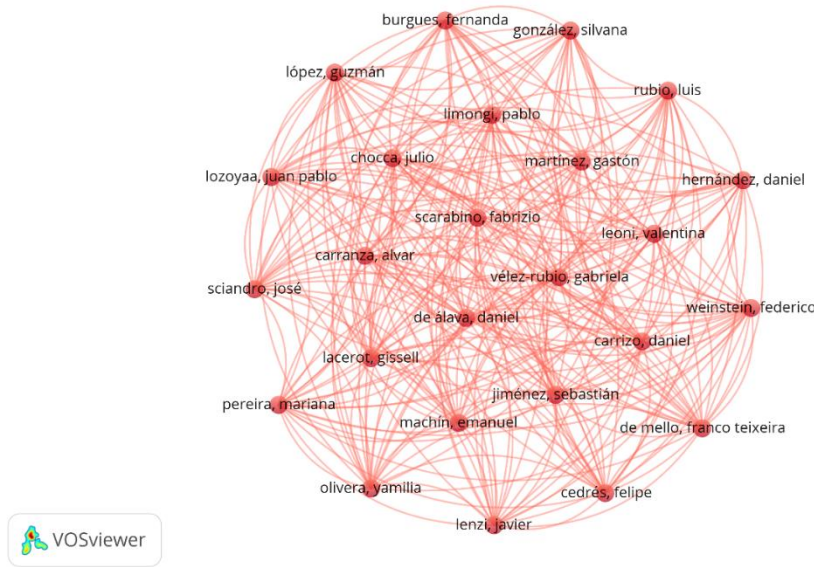


Figure 4. Author Visualization
 Source: Data Analysis Result, 2026

In Figure 4, a dense co-authorship network with many connections between a very high number of researchers shows the presence of a very collaborative research environment where there are no separate author clusters at all. Such nodes as Scaraboto, Fabrizio; Limongi, Pablo; Martínez, Gastón; González, Silvana; Rubio, Luis; Hernández,

Daniel; Carrizo, Daniel; Jiménez, Sebastián; etc., form the central nodes with multiple connections that serve as collaboration centers within the field. The unification of the red color shows only one dominating cluster, which means that there is some coherence within the research field.

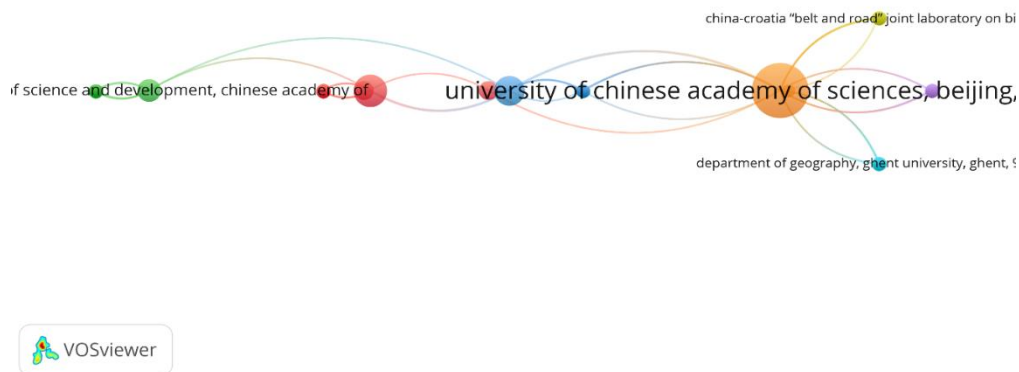


Figure 5. Institution Visualization
 Source: Data Analysis Result, 2026

Figure 5 depicts an institutional collaborative network where the University of Chinese Academy of Sciences (Beijing) plays the role of the central dominating hub characterized by a larger node and higher connectivity. This institution acts as the primary mediator connecting a number of institutions located in various geographical areas based on the China-focused research pattern coupled with significant international

outreach. In the right side, collaborations can be seen reaching out to institutions including the China-Croatia “Belt and Road” Joint Laboratory on Biodiversity and the Department of Geography, Ghent University, thus depicting the active cross-border scientific collaboration especially in the domain of environmental and geographical research.

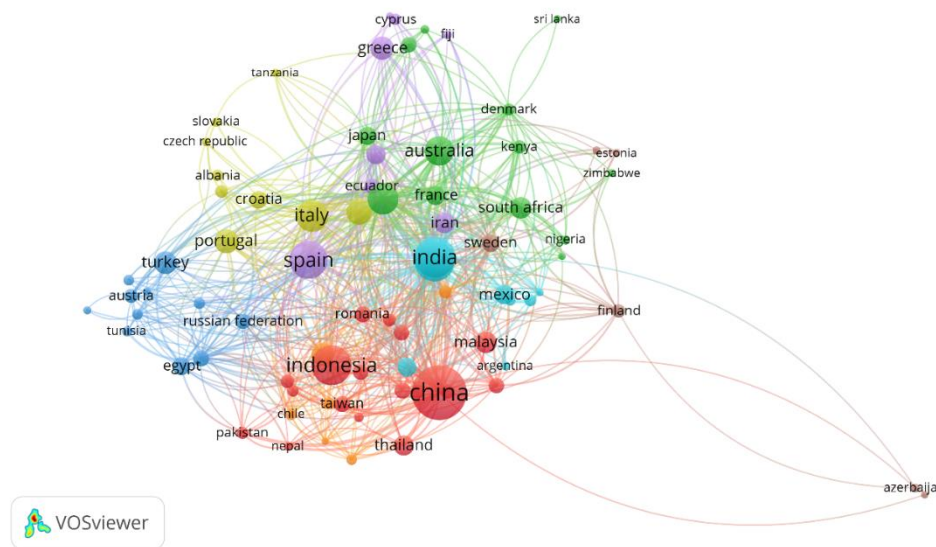


Figure 6. Country Visualization
 Source: Data Analysis Result, 2026

The last figure illustrates the pattern of international collaboration among researchers in the study area, wherein China becomes the dominant central node, implying the most number of publications as well as connectivity with other nations. Proximity to China, there is an emergence of an extremely well-connected group of Asian countries including Indonesia, India, and Malaysia which implies high regional collaboration and involvement of emerging economies in

research works. The other cluster of collaboration in the network consists of countries belonging to Europe including Spain, Italy, France, and Portugal. This is due to the presence of relatively equal connections of these countries to the Asian and African nations, implying bridging contributions among regions. There are also some countries like Australia, South Africa, and Mexico which serve as secondary hubs and act as bridges for various clusters.

3.3 Citation Analysis

Table 1. Top Cited Research

Citations	Authors and year	Title
621	[15]v	Human health and ocean pollution
581	[16]	Impact of tourism development upon environmental sustainability: a suggested framework for sustainable ecotourism
548	[17]	Mapping the global value and distribution of coral reef tourism

Citations	Authors and year	Title
535	[18]	Advances and challenges in sustainable tourism toward a green economy
452	[19]	Overcoming the impacts of aquaculture on the coastal zone
310	[20]	Present state and future prospects for groundwater ecosystems
300	[21]	Rapid decline of snow and ice in the tropical Andes – Impacts, uncertainties and challenges ahead
240	[22]	The effects of tourism development on rural livelihoods in the Okavango Delta, Botswana
224	[23]	The consequences of tourism for sustainable water use on a tropical island: Zanzibar, Tanzania
216	[24]	Environmentally friendly behavior: Can heterogeneity among individuals and contexts/environments be harvested for improved sustainable management?

Source: Scopus, 2026

Based on the tables of top-cited research in relation to water, tourism, and environmental sustainability, it can be concluded that the intellectual background of the subject area is firmly grounded in issues of environmental pollution, coastal and marine ecosystems, as well as the regulation of sustainable tourism. The top-cited paper ([15]; 621 citations) addressing the relationship between human health and marine environmental pollution demonstrates the importance of this connection, which makes environmental pollution a multidisciplinary issue, reaching beyond ecology into the sphere of human health and well-being. Likewise, highly-cited papers like [17], focused on coral reef tourism, and [19] on the impact of aquaculture demonstrate the vulnerability of coastal and marine ecosystems under pressure of tourism and economics.

A second dominant theme of research is concerned with sustainable tourism framework and models of environmental management. The theoretical frameworks developed by [16] and [25] provide conceptual frameworks and policies on how tourism can be integrated with sustainability and green economy. This means that the field is moving beyond just identifying the impacts of tourism on the environment to the area of governance and planning. On the other hand, [22] discuss the socioeconomic impact of tourism on rural livelihoods.

The other highly cited studies broaden the field of study by extending to hydrologic and environmental systems, especially through research in groundwater ecosystems [20] and effects of declining cryosphere on the Andes mountains [21]. They broaden the field of inquiry beyond tourism-focused inquiries and integrate tourism water management research into larger earth system science inquiry. [24] introduce behavioral aspects to research on environmentally friendly behavior.

4. CONCLUSION

Through the bibliometric analysis on water management in sustainable tourism, it can be shown that this field of study is embedded within the paradigm of sustainable development, and it has robust cross-disciplinary links between environmental sciences, tourism, and resource management. It becomes clear through the analysis that research is largely clustered along central topics such as water management, water quality, climate change, and ecotourism, which means that water issues are mostly discussed in relation to sustainability and tourism development. Network and thematic visualization helps understand that the intellectual structure of the field is well developed because environmental protection, ecosystem services, and technologies (GIS and remote sensing) serve as subdomains of the topic.

Furthermore, the co-authorship and cross-country collaborations have pointed out that the research is connected on a global scale but not uniformly distributed, because some powerful countries, such as China, and powerful institutions act as focal points for knowledge creation and collaboration. In

terms of citations, the foundational works come from environmental science and marine ecosystems, but recent publications stress the importance of sustainable tourism governance, climate adaptation, and socio-environmental resilience.

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