Aliansi : Jurnal Politik, Keamanan dan Hubungan Internasional
Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

Research Landscape On Watershed Management In Indonesia; A Bibliometric Analysis

Muh. Sofyan Budiarto[1, 2], Ida Widianingsih[1], Raden Ahmad Buchari[1], Entang A. Muhtar[1], Herri Saksono[3]
[1]Graduate Program, Faculty of Social and Politic, Universitas Padjadjaran
[2]. Regional Planning and Development Agency
[3] Research and Development Agency, Ministry of Home Affairs
budiarto.sofyan@gmail.com

ABSTRACT

The research goal is to investigate the evolution of watershed management research through an investigative scientific article published by Indonesian researchers in various journals and conferences indexed by Scopus. Scopus publication data was searched using the terms "watershed management" and "Indonesia," and the results were narrowed down by paper type, topic area, and affiliate country. Totally, 181 retrieved articles are then analysed with R Studio and Vos Viewer software for analysis related to bibliometric profile, authorship, co-occurrence, and collaboration. From 1982 to 2021, there was a rise in the number of publications with the topic of watershed management in Scopus indexed journals and proceeding articles. The productivity of publications is increasing. The IOP Conference on Earth and Environment has become the main reference for publications by scholars from Indonesia, with a total of 68 articles published. Bogor Agricultural University is the most productive institutional with 31 articles published. The most productive writers are Arifin (affiliated with University of Lampung) and Suryaatmojo (affiliated with Gadjah Mada University), both of whom had five articles published. Collaborations between authors and nations such as the United States, Canada, and Japan demonstrate the most prevalent research collaborations on relevant topics. In Indonesia, research on the theme of watershed management is still dominant in scientific perspectives such as the environment, forestry, flood control, disaster management, and climate change, so research in other perspectives of blended knowledge, such as public administration, is required for future research.

***Keywords**: bibliometric analysis, watershed management, R studio, scopus article, indonesia*

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386

INTRODUCTION

One of the interesting research themes to study is related to watershed management. The problems that affect watersheds are complex and long-term in nature (Gregersen et al., 2007a)(Zuriyani, 2017), and an ancient concept, was defined in Vedic texts from India that date from 1,000 B.C.(Chandra, 1990)(Neary, 2000)(Malik, 2016)(Kumar Singh et al., 2020). The theme of watershed management became an interesting theme in Indonesia for research since the 1970s when degradation, land conversion, erosion, and flooding became serious problems in managing water resources (Sudaryono, 2002)(Pasandaran et al., 2010)(Waskitho et al., 2021)(Purwanto, 2016). The degradation process continues because there is no integrated action and effort made by the sector or parties with an interest in the watershed (Nugraheni, 2008)(Fulazzaky, 2014)(Purwanto, 2016)(Direktorat Kehutanan dan Konservasi Sumberdaya Air, 2017). Sectoral integration is influenced by several factors such as communication, coordination, cooperation, policies and regulations as main problems in watershed management in Indonesia. (Waskitho et al., 2021)(Sulistyaningsih, et al., 2021). The Watershed management problem in the institutional aspect were hierarchical confusion, discrepancy, and asynchrony among regulations, and weak (participation, synchronization, and coordination) among watershed management stakeholders (Sudaryono, 2002)(Narendra et al., 2021) .

Watershed damage is addressed in a number of ways by various sectors, and policies that are not integrated among government institutions have failed to address multiple watershed issues in Indonesia.(Sudaryono, 2002)(Susanto, 2017)(Zuriyani, 2017). The Forestry Research and Development Agency has taken strategic steps by establishing an Integrative Research Plan (RPI) for 2010–2014 in accordance with the ministry's policy priorities and the Forestry Research and Development Roadmap 2010–2025(Maryani et al., 2014). Increased watershed management research and publications in Indonesia have had no substantial impact on watershed management, as indicated by the growth of critical watersheds in Indonesia. Much technical scientific study has been conducted on watershed management, soil and water conservation, and catastrophe mitigation. However, few scientific and research findings have formed the foundation and pillars of watershed management strategies.(Hardy, 2010).

The number of academic publications is increasing at a rapid pace and it is becoming increasingly unfeasible to remain current with everything that is being published. This hampers the ability to accumulate knowledge and actively collect evidence through a set of previous research papers.(Aria & Cuccurullo, 2017). Science mapping aims to build bibliometric maps that describe how specific disciplines, scientific domains, or research fields are conceptually, intellectually, and socially structured(Liu, 2013). Information processing permeates the scientific enterprise, generating and organizing knowledge about nature and the universe(Guler et al., 2016).
Manuscript's attributes are connected to each other through the manuscript itself: author(s) to journal, keywords to publication date, etc. These connections of different attributes generate bipartite networks that can be represented as rectangular matrices (manuscripts x attributes). Co-authorship in publications is widely considered as a reliable proxy for scientific mapping(Gazni et al., 2013). Furthermore, scientific publications regularly contain references to other scientific works. The bibliometric methods of citation analysis, co-citation analysis, bibliographical coupling, co-author analysis, and co-word analysis and present a workflow for conducting bibliometric studies with guidelines for researchers(Zupic & Čater, 2015). These networks are analysed in order to capture meaningful properties of the underlying research system, and in particular to determine the influence of bibliometric units such as scholars and journals(Aria & Cuccurullo, 2021)

Studies on watersheds have been conducted by many researchers, with various focuses and approaches, but none have carried out using the systematic review approach (Sulistyaningsih, Nurmandi, Kamil, et al., 2021). Evolutionary studies or the development studies of the field of sciences attract researchers to navigate and examine such type

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

of studies(Widianingsih et al., 2021). Several bibliometric studies related to watershed management on global perspective have been carried out by (Widianingsih et al., 2021), (Sulistyaningsih et al., 2021). Scholars use different qualitative and quantitative literature reviewing approaches to understand and organize earlier findings.

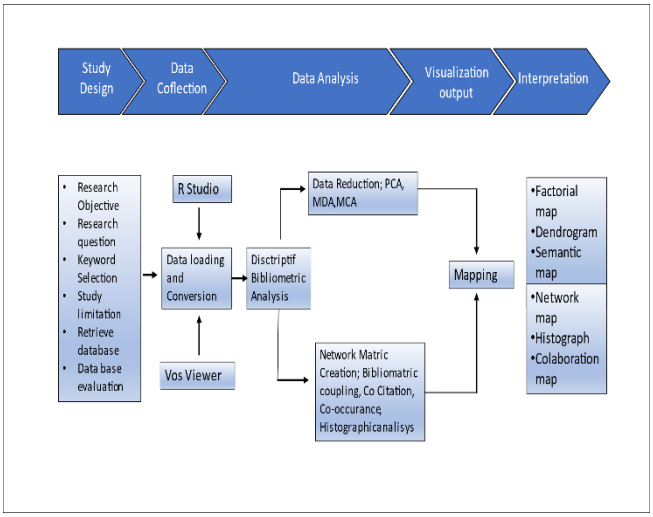
Watershed research mostly addresses watershed management issues in the field. The factual dynamics that occur in watershed management have a role in establishing the themes and trends of watershed research in Indonesia. In this work, the author used a publishing strategy to undertake a bibliometric analysis of the progress of research on watershed management that has been published in Scopus-indexed journals and proceedings by Indonesian scholars to explore the development stage of watershed management research theme and practices.

METHODOLOGY

In accordance with the research objectives, the authors conducted a bibliometric and scientometric analysis of the papers that have discussed watershed management in Indonesia. This study uses the Scopus dataset because the Scopus data base has comparable accessibility and reach wider for social sciences and humanities. The data were obtained through an electronic search of Scopus publication database on year 1992 and November 2021 of. A total number of 181 selected documents (from total 331 documents retrieve) comprising of articles, review, proceedings papers, and book chapters were retrieved from the Scopus database. However, documents such as editorials, corrections, and notes were excluded. The refinement process in Scopus is as follows:
(TITLE-ABS-KEY (watershed AND management) AND TITLE-ABS-KEY (Indonesia)) AND (LIMIT-TO (SUBJAREA, "ENVI") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "DECI") OR LIMIT-TO (SUBJAREA , "MULT")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (AFFILCOUNTRY , "Indonesia")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "cr"))

The results of the electronic search were exported and loaded into Bibliometric package for R v.3.6.1 and VOS viewer v.1.6.14 for bibliometric and scientometric analyses. Logical framework of this research shown in the figure 1.

Figure 1. Main phase of methodology adopted from (Aria & Cuccurullo, 2021), edited by author.



RESULT AND DISCUSSION

4.1 Bibliometric Descriptive Analysis

The analysis of bibliometric results starts with a description of the main bibliometric statistics. Subsequently, the investigation considers authors, indicators, information, and the countries of research (Secinaro et al., 2020). Subsequently, each of the aforementioned categories are thoroughly analysed using the following elements: (1) type of documents, (2) annual scientific production, (3) scientific sources, (4) source growth, (5) number of articles per author, (6) author's dominance ranking, (7) author's keywords, (8) topic dendrogram, (9) the factorial map of the document with the highest contributions, (10) articles' citations, (11) country's production, (12) country's citation, (13) the country collaboration map, and (14) the country collaboration network (Secinaro et al., 2020)

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

Main Information	*Explanation*	*No*
Timespan	*Year of Publication*	*1982:2021*
Sources (Journals, Books, etc)	*Distribution article published*	*83*
Documents	*Number of articles retrieve*	*181*
References	*Total number of references cite*	*5398*
Keywords Plus (ID)	*Total number of phrases that frequently appear in the title of an article's references*	*1243*
Authors	*Total number of authors*	*610*
Author Appearances	*The authors' frequency distribution*	*685*
Authors of single-authored documents	*The number of single authors per articles*	*15*
Authors of multi-authored documents	*The number of authors of multi-authored articles*	*595*
Authors per Document	*Average number of authors in each document*	*3,37*
Co-Authors per Documents	*Average number of co-authors in each document*	*3,78*
Collaboration Index	*Average number of citations in each article*	*3,58*

Table 1. Main information of the data retrieve

Source: Author elaboration

Table 1 provides a brief summary of the data evaluated in this bibliometric study by describing the Scopus data received from the Scopus database. A summary of the timespan, documents (source, kind, reference keywords), authors (appearance, single authors, multi-authors, author per document), and collaboration index. The bibliometric study is in line with the national trend and coincides with the initiation of research on the watershed management topic. The analysis spans 29 years of scientific output. The number of journal and proceeding is 83 as indicating the distribution articles published and the total number of articles retrieve is 181. Keywords plus, which is the number of keywords that appear often in an article's title, was four times more than the number of articles. The greatest notable rise in published publications, however, happened in the last three years

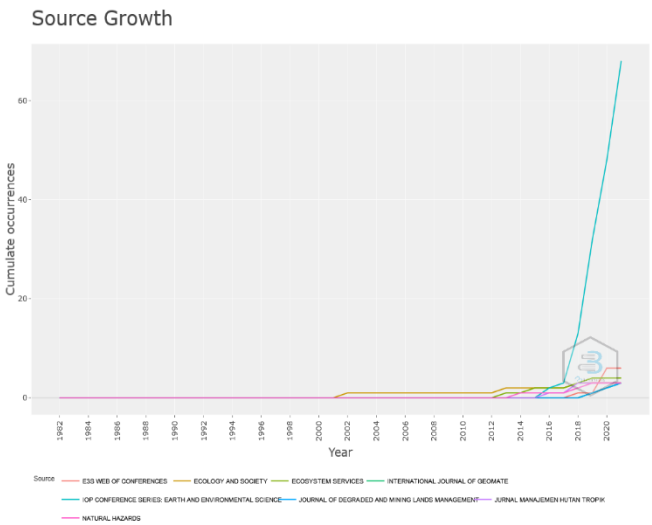


Figure 2. The Evolution of Watershed Management Publications

Retrieving Scopus articles is not limited to a time range, and publications are obtained from 1982 to November 2021. Overall, there has been an increase number in publications, especially from 2016 to the present, as shown in figure 2 above. Since the first IOC Conference on Earth and Environment in 2015, there has been a significant increase in the number of Scopus articles published. The number of articles published in journals also increased, along with several journals being included in the Scopus indexation. The most interesting thing is that scholars prefer to publish articles in the proceedings of the IOC International Conference on Earth and Environment rather than in Scopus-indexed journals.

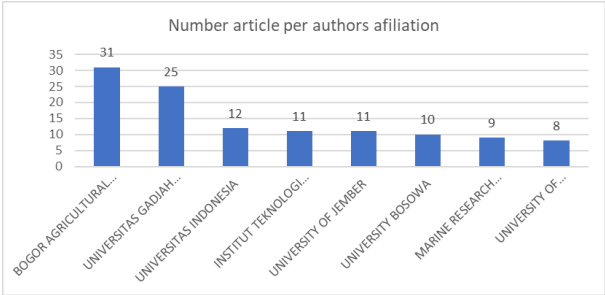


Figure 3. Affiliation productivity

The number of articles published by scholars affiliated with certain institutions demonstrates the productivity of institutional publishing. The higher an institution's productivity, the more publications it has; conversely, the lower an institution's production, the less publications it has. Agricultural University is the most productive institutional affiliation in producing publications from its authors, with 31 publications. Universitas Gadjah Mada is the number two affiliated institution that produces publications with a number of publications reaching 25. Followed by the University of Indonesia with 12 publications, Bandung Institute of Technology with 11publications and University of Jember with 11 publications.

4.2 Authors

Figure 4 shows the productivity of authors and the time range for authors conducting research and publishing in the Scopus journal or proceeding. From 2002 to

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

2021, based on the number articles published Arifin and Suryatmaja most productive author with each author published 5 papers. Number publication increasing in last 4 year regarding the increasing new scholars published their article. In the period 2018–2021, many new authors publish their articles in Scopus-indexed journals and/or proceedings

Figure 4. 20th Most Authors productivity over time

Document	*Year*	*Local Citations*	*Global Citations*
(Leimona et al., 2015)	*2015*	*4*	*34*
(Fauzi & Anna, 2013)	*2013*	*3*	*36*
(Surya et al., 2020)	*2020*	*2*	*17*
Kusumandari, 1997	*1997*	*1*	*26*
(Asdak et al., 2018)	*2018*	*1*	*16*
Leimona et.all., 2010,	*2010*	*1*	*16*
(Surya et al., 2020)	*2020*	*1*	*10*
(Ridwansyah et al., 2020)	*2020*	*1*	*5*
(Yonariza et al., 2019)	*2019*	*1*	*5*
Permatasari et all., 2019	*2019*	*1*	*5*

.

Table 2. Most Local and Global Citation by Indonesia Authors

Citation impact indicators nowadays play an important role in research evaluation, and consequently these indicators have received a lot of attention in the bibliometric and scientometric literature(Waltman, 2016). Table 2 indicating citation by author publication by local citation and global citation. Leimona article the most cite document in spare of local and global. All local citation indicates lowest than global citation for all document publishes by Indonesia scholars that meant some research theme and topic on watershed in Indonesia interesting for global scholars. It also shows that the theme of research on watershed management in Indonesia follows the development of science on the theme of watershed management.

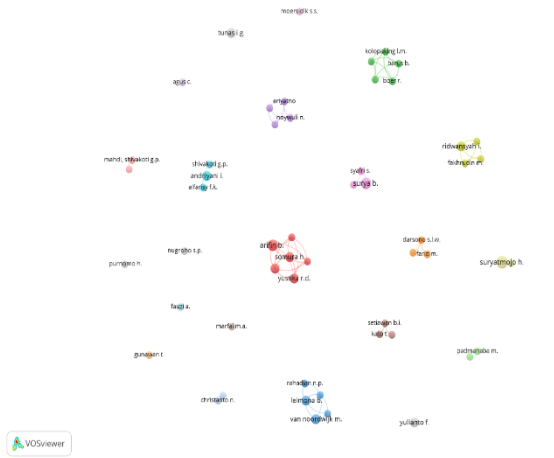


Figure 5. Author groups research and publication

Figure 5 shows the group of authors conducting research and publishing scientific articles in Scopus-indexed journals or proceedings. Authors in a group are frequently grouped and are represented by the same colour. There are at least two or more authors in one group who have competence in the same topic or affiliated with the same institution. It can be seen that Arifin and his groups are the largest author group. There was the Barus group, the Mahdi group, the Andriyani group, the Vanoordwick group, the Leimona group and others. Each group of authors represent their institution or the same research study interest.

4.3 The Evolution of Watershed Research Themes

6 shows the keywords that have become a trending topic in research and publications over a certain period of time. Waste management, watershed, rivers, sustainable development, climate change, and land use are among the hot topics in 2020–2021.Trend analysis topics can find out the themes that become research and publication trends at a certain time. The size circle shows the frequency of keywords. Watershed is most frequency keyword and become trending theme in 2020 rather than other keywords. Waste management and floods most popular keywords in 2021 even low in frequent cited. Watershed

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

research is common in all research circles to refer to upstream research as being the more basic research in such relevant disciplines as chemistry, hydrology, statistics, soils, etc. Downstream research on the other hand is a term used to designate applied and adaptive research, with watershed management action research as the far end of the continuum.(Gregersen et al., 2007b). However, the research theme based on the figure above shows the dynamics of research related to downstream themes that have developed recently.

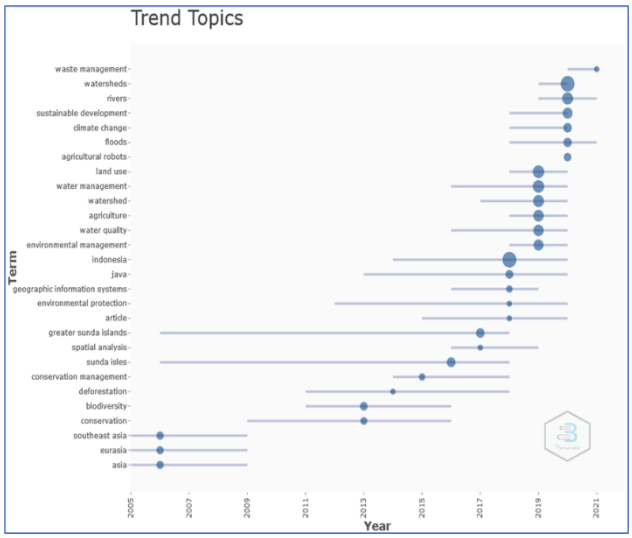


Figure 6. Trend topic research theme in periodic time

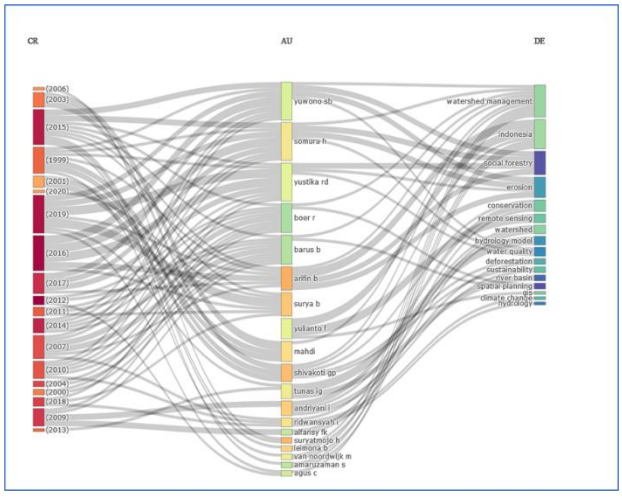
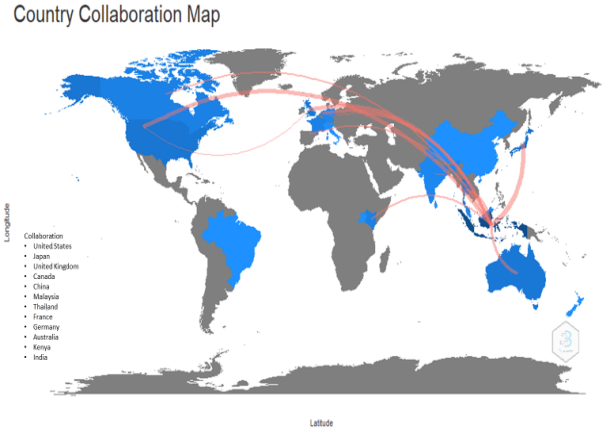


Figure 7. Three-Fields Plot Analysis

Figure 7, shows the relationship between the year of publication (left), authors (middle), and the theme of publication (right) author. In the figure above, it can be seen who (the author) conducted the publication/research on what theme and when the publication was carried out. Several authors publish different themes in different years. The theme of watershed management in various dimensions is an interesting one for scholars to conduct research on. Relationships between individual participants in a network are often created on the basis of joint publications and represent the degree of collaboration between regular study groups and secret groups of experts.(Aria et al., 2020). Some author writes on different name for their institution, for example; Suryatmojo using Gadjah Mada Univesity for an article, while in other article using Universitas Gadjah Mada. It means that need consistencies on using the elaborate author institution on publishing the articles.

4.4 International Collaboration Mapping

Figure 8. The map of collaboration research



and publication between Indonesia Scholars and scholars from others countries.

The nation cooperation map depicts collaboration between Indonesian authors and authors from other countries There are 12 countries that work with Indonesian researchers to conduct research and generate papers. The benefits and merits of research collaboration include: sharing and transferring knowledge and research equipment, and research funding connecting scholars from Indonesia to a large scientific network, expediting the research process, and increasing the visibility of articles. The cooperation map depicts the link and relationship of a scholar or group of academics working on research and publishing with researchers from other universities. Several collaboration approaches (research networks) are commonly connected

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

with cooperative research with foreign universities. The growth of this phenomenon has encouraged many scientometricians to conduct research in order to investigate collaboration at different levels and inform scientific policy makers who evaluate the scientific output of their countries. Global Co authorship levels and collaborations across all scientific domains at the author, institution, and country level.

CONCLUSIONS

There was an increase in the number of publications published by Indonesian scholars on the topic of watershed management in Scopus indexed journals and proceeding articles from 1982 to 2021. The output of publications is growing. With a total of 68 articles published, the IOP Conference on Earth and Environment has become the primary reference for publications by Indonesian researchers. Bogor Agricultural University is the most productive institutional with 31 articles published. Arifin (University of Lampung) and Suryaatmojo (University of Gadjah Mada), both of whom had five articles published, are the most productive writers. Partnerships between writers and countries such as the United States, Canada, and Japan are the most common research collaborations on important themes. In Indonesia, research on the theme of watershed management remains dominant in scientific perspectives such as the environment, forestry, flood control, disaster management, and climate change, so research in other blended knowledge perspectives, such as public administration, is required for future research. This research solely uses data from the Scopus database and does not include data from other national and international indexation publications. In future study, bibliometric analysis employing the WOS database source, particularly Sinta indexation (Indonesian Science Indexation) was required. This is due to the possibility that academics and scholars emphasize publishing in Sinta-indexed national scholarly papers.

REFERENCE

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. Journal of Informetrics, 11(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Aria, M., & Cuccurullo, C. (2021). Package ' bibliometrix ' Reference manual. Comprehensive Science Mapping Analysis. https://www.bibliometrix.org/

Aria, M., Misuraca, M., & Spano, M. (2020). Mapping the Evolution of Social Research and Data Science on 30 Years of Social Indicators Research. Social Indicators Research, 149(3), 803–831. https://doi.org/10.1007/s11205-020-02281-3

Asdak, C., Supian, S., & Subiyanto. (2018). Watershed management strategies for flood mitigation: A case study of Jakarta's flooding. Weather and Climate Extremes, 21, 117–122. https://doi.org/10.1016/j.wace.2018.08.002

Chandra, S. (1990). Hydrology in Ancient India. National Institute of Hydrology.

Direktorat Kehutanan dan Konservasi Sumberdaya Air. (2017). Kajian Model Pengelolaan Daerah Aliran Sungai (DAS) Terpadu. 2.

Fauzi, A., & Anna, Z. (2013). The complexity of the institution of payment for environmental services: A case study of two Indonesian PES schemes. Ecosystem Services, 6, 54–63. https://doi.org/10.1016/j.ecoser.2013.07.003

Fulazzaky, M. A. (2014). Challenges of integrated water resources management in Indonesia. Water (Switzerland), 6(7), 2000–2020. https://doi.org/10.3390/w6072000

Gazni, A., Sugimoto, C., & Didegah, F. (2013). MappingWorld Scientific Collaboration: Authors, Institutions, and Countries Ali. Journal of the American Society for Information Science and Technology, 64(July), 1852–1863. https://doi.org/10.1002/asi

Gregersen, H. M., Ffolliott, P. F., & Brooks, K. N. (2007a). Integrated watershed management: Connecting people to their land and water. Integrated Watershed Management: Connecting People to Their Land and Water, 1–

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

201. https://doi.org/10.1659/mrd.mm042

Gregersen, H. M., Ffolliott, P. F., & Brooks, K. N. (2007b). Integrated watershed management: Connecting people to their land and water. In Integrated Watershed Management: Connecting People to Their Land and Water. https://doi.org/10.1659/mrd.mm042

Guler, A. T., Waaijer, C. J. F., & Palmblad, M. (2016). Scientific workflows for bibliometrics. Scientometrics, 107(2), 385–398. https://doi.org/10.1007/s11192-016-1885-6

Hardy, S. D. (2010). Governments, group membership, and watershed partnerships. Society and Natural Resources, 23(7), 587–603. https://doi.org/10.1080/08941920802534572

Kumar Singh, P., Dey, P., Kumar Jain, S., & Mujumdar, P. P. (2020). Hydrology and water resources management in ancient India. Hydrology and Earth System Sciences, 24(10), 4691–4707. https://doi.org/10.5194/hess-24-4691-2020

Leimona, B., Lusiana, B., Van Noordwijk, M., Mulyoutami, E., Ekadinata, A., & Amaruzaman, S. (2015). Boundary work: Knowledge co-production for negotiating payment for watershed services in Indonesia. Ecosystem Services, 15, 45–62. https://doi.org/10.1016/j.ecoser.2015.07.002

Liu, X. (2013). Full-Text Citation Analysis : A New Method to Enhance. Journal of the American Society for Information Science and Technology, 64(July), 1852–1863. https://doi.org/10.1002/asi

Malik, S. (2016). Conceptual Aspect of Hydrological Cycle in Indian Mythology of Kishkindha Kanda, Ramayana. 6(4), 54–59. www.iiste.org

Maryani, R., Alviya, I., Wicaksono, D., Suka, A. P., Hakim, I., Rohmanudin, J., & Effendi, R. (2014). Manajemen Lanskap Hutan Berbasis DAS.

Narendra, B. H., Siregar, C. A., Dharmawan, I. W. S., Sukmana, A., Pratiwi, Pramono, I. B., Basuki, T. M., Nugroho, H. Y. S. H., Supangat, A. B., Purwanto, Setiawan, O., Nandini, R., Ulya, N. A., Arifanti, V. B., & Yuwati, T. W. (2021). A review on sustainability of watershed management in Indonesia. Sustainability (Switzerland), 13(19), 1–29. https://doi.org/10.3390/su131911125

Neary, D. G. (2000). Changing Perceptions of Watershed Management from a Retrospective Viewpoint. USDA Forest Service Proceedings, 167–176.

Nugraheni, S. (2008). Pengelolaan Sumber Daya Alam dan Lingkungan Berbasis Masyarakat. Majalah Parahyangan, Atmojo, 1–19.

Pasandaran, E., Sutrisno, N., & Suherman. (2010). Politik Pengelolaan DAS. Membalik Kecenderungan Degradasi Sumber Daya Lahan Dan Air, 243–260.

Purwanto, et. al. (2016). Pengelolaan Daerah Aliran Sungai (DAS) Mikro. UNS Press.

Ridwansyah, I., Yulianti, M., Apip, Onodera, S. ichi, Shimizu, Y., Wibowo, H., & Fakhrudin, M. (2020). The impact of land use and climate change on surface runoff and groundwater in Cimanuk watershed, Indonesia. Limnology, 21(3), 487–498. https://doi.org/10.1007/s10201-020-00629-9

Secinaro, S., Brescia, V., Calandra, D., & Biancone, P. (2020). Employing bibliometric analysis to identify suitable business models for electric cars. Journal of Cleaner Production, 264(April), 121503. https://doi.org/10.1016/j.jclepro.2020.121503

Sudaryono. (2002). Pengelolaan daerah aliran sungai (das) terpadu, konsep pembangunan berkelanjutan. Jurnal Teknologi Lingkungan, 3(2), 153–158.

Sulistyaningsih, T., Nurmandi, A., Kamil, M., Roziqin, A., Salahudin, Jainuri, Sihidi, I. T., Apriyanto Romadhan, A., & Loilatu, M. J. (2021). Formulating Sustainable Watershed Governance Model: A Meta-analysis of Watershed Governance. Academic Journal of Interdisciplinary Studies, 10(2), 90–104. https://doi.org/10.36941/ajis-2021-0041

Sulistyaningsih, T., Nurmandi, A., Salahudin,

Nomor eISSN : 2829-1794 *Special Edition* September 2022 Hal : 386-394

S., Roziqin, A., Kamil, M., Sihidi, I. T., Romadhan, A. A., & Loilatu, M. J. (2021). Public policy analysis on watershed governance in Indonesia. Sustainability (Switzerland), 13(12). https://doi.org/10.3390/su13126615

Surya, B., Syafri, S., Sahban, H., & Sakti, H. H. (2020). Natural resource conservation based on community economic empowerment: Perspectives on watershed management and slum settlements in Makassar City, South Sulawesi, Indonesia. Land, 9(4). https://doi.org/10.3390/land9040104

Susanto, M. Y. J. P. dan A. (2017). Pengantar Pengelolaan Sumber Daya Air. Modul Pengelolaan Sumberdaya Air, 1(1), 1–51. http://repository.ut.ac.id/4313/1/PWKL4221-M1.pdf

Waltman, L. (2016). A Review of the Literature on Missing Data. Journal of Informetrics, 10(2), 365–391. http://eric.ed.gov/?id=ED448174

Waskitho, N. T., Pratama, A. A., & Muttaqin, T. (2021). Sectoral Integration in Watershed Management in Indonesia : Challenges and Recomendation. IOP Conference Series: Earth and Environmental Science, 752(1). https://doi.org/10.1088/1755-1315/752/1/012035

Widianingsih, I., Paskarina, C., Riswanda, & Putra, P. (2021). Evolutionary Study of Watershed Governance Research: A Bibliometric Analysis. Science & Tehnology Libraris.

Yonariza, Andini, B. A., Mahdi, & Maynard, S. (2019). Addressing knowledge gaps between stakeholders in payments for watershed services: Case of Koto Panjang hydropower plant catchment area, Sumatra, Indonesia. Ecosystem Services, 39(July), 100995. https://doi.org/10.1016/j.ecoser.2019.100995

Zupic, I., & Čater, T. (2015). Bibliometric Methods in Management and Organization. Organizational Research Methods, 18(3), 429–472. https://doi.org/10.1177/1094428114562629

Zuriyani, E. (2017). Dinamika Kehidupan Manusia Dan Kondisi Sumberdaya Alam Daerah Aliran Sungai. Jurnal Spasial, 3(2). https://doi.org/10.22202/js.v3i2.1607