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Article

Fostering Environmental Awareness Through Eco-Literacy in Novels: A Bibliometric Review

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ABSTRACT

Due to rising worldwide environmental issues, eco-literacy and environmental consciousness have received emphasis in recent years. This phenomenon implicitly suggests that novels can significantly elucidate intricate ecological concepts. This study aims to uncover the underlying currents that shape the discourse around eco-literacy in novels and their influence on societal perceptions of the environment. This study used Scopus and Web of Science (WoS) databases to gather and analyse datasets. ScientoPy and VOSviewer were then used to analyse the retrieved datasets. This study found that temporal trend analysis showed a gradual increase in research production, notably after 2005, showing a growing interest in the connection between eco-literacy and novel studies. The prevalence of keywords such as "environmental education", "eco-criticism", and "environmental communication" demonstrates the significance of literature as a tool for cultivating environmental awareness, critical analysis, and effective communication in novels. This study contributes to the field by comprehensively evaluating the temporal patterns, thematic themes, and collaborative networks within eco-literacy domains and new research

Keywords: eco-literacy; eco-criticism; environmental awareness; environmental communication; environmental education.

RESUMO

Devido ao crescente aumento das questões ambientais em todo o mundo, a ecoalfabetização e a consciência ambiental têm recebido ênfase nos últimos anos. Esse fenômeno sugere implicitamente que os romances podem elucidar de forma significativa conceitos ecológicos intricados. Este estudo tem como objetivo desvendar as correntes subjacentes que moldam o discurso em torno da ecoalfabetização em romances e sua influência nas percepções da sociedade sobre o meio ambiente. Foram utilizadas as bases de dados Scopus e Web of Science (WoS) para coletar e analisar os conjuntos de dados. Em seguida, ScientoPy e VOSviewer foram empregados para analisar os conjuntos de dados recuperados. Este estudo constatou que a análise de tendências temporais mostrou um aumento gradual na produção de pesquisa, especialmente após 2005, evidenciando um interesse crescente na conexão entre ecoalfabetização e estudos de romances. A prevalência de palavras-chave como "educação ambiental", "eco-crítica" e "comunicação ambiental" demonstra a importância da literatura como ferramenta para cultivar a conscientização ambiental, a análise crítica e a comunicação eficaz nos romances. Este estudo contribui para o campo ao avaliar de forma abrangente os padrões temporais, temas temáticos e redes colaborativas dentro dos domínios da ecoalfabetização e novas pesquisas.

Palavras-chave: ecoalfabetização; eco-crítica; conscientização ambiental; comunicação ambiental; educação ambiental.

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Introduction

The growing passion of the global environmental disaster has heightened the importance of cultivating environmental education and awareness within communities (Abdullah and Sofyan 2023a). One conceivable rationale is that pressing global environmental concerns, such as climate change, biodiversity loss, and resource depletion, have been identified as bearing substantial adverse effects on society and its environs (Abdullah 2023). The issue of climate change is of considerable importance due to its profound effects on the loss of biodiversity and the necessity for mitigation measures (Habibullah et al. 2022; Scherer et al. 2020). The issue of biodiversity loss presents a significant and pressing concern since it poses hazards to species across a wide range of taxonomic groups, necessitating the implementation of conservation measures (Turney, Ausseil, and Broadhurst 2020). The exhaustion of resources, encompassing the exploitation of rangelands, forests, and water supplies, is a significant apprehension (Mousavi, Sarshad Ghahfarokhi, and Soltani Koupaei 2020). The challenges mentioned demonstrate interdependence, demanding a deliberate and unified strategy for their mitigation.

Fostering environmental awareness and sustainable behaviour is crucial in addressing the urgent challenges of pollution, climate change, and biodiversity loss. It is vital to convey to individuals the consequences of unsustainable behaviours and the need for action to build a more environmentally sustainable world (Turchet and Hueller 2020). While top-down approaches, such as legislative frameworks, can impose sanctions, they may not be sufficient to induce the necessary changes. Therefore, bottom-up approaches that foster pro-environmental behaviours through social norms have gained interest. Social norms, which arise from expectations about how others behave, can promote pro-environmental behaviour (Perry et al. 2021).

Literature holds historical and cultural significance in shaping societal perceptions and attitudes. It reflects society, capturing its essence and symbolising its psyche (Ajidahun 2017). By examining literary works, individuals can gain a deeper understanding of the nature of society and its various aspects. Literature also serves as a means of questioning cultural assumptions, challenging stereotypes, and promoting cultural awareness, which provides means to test the prevalent view that literature is a moral or cultural enclave (Williams 2018). It acts as a tool for archiving and transmitting societal changes, responding to the evolving needs and interests of the audience.

Eco-literacy is the concept of understanding and awareness of ecological systems and environmental interconnections (Noviana et al. 2019). This indicates that eco-literacy integrates ecological knowledge with linguistic frameworks and ethical considerations. Eco-literacy has three broad dimensions blended environmental attitude and sensitivity, pro-environmental behaviours, and environmental knowledge (Nunez and Clores 2017). Evaluating eco-literacy can be quantitatively undertaken using indicators and questions (Ha et al. 2022). Eco-literacy strongly correlates with the qualitative advancement of individuals' identities and can be effectively nurtured through adult education (Yao 2019). According to Puspitasari and Khomarudin (2020), students must comprehensively understand ecological ideas and actively participate in resolving environmental issues. Sustainable education is paramount in fostering eco-literacy, facilitating transformations in knowledge, consciousness, and sustainable behaviours (Hartono 2020).

Novels have the potential to promote eco-literacy by leveraging their storytelling power to convey complex ecological concepts. Through narratives that meander and explore various perspectives, novels like Christine Montalbetti's "Journee Americaine" can encourage readers to consider the ecological implications of the text and how the environment participates in the story (McConnell 2020). Transition stories, such as "Parable of the Sower", written by Octavia Butler and "The Ministry for the Future", written by Kim Stanley Robinson, offer feasible ideas for orchestrating economic and social change, making them effective instruments for

bringing about a mind-shift towards sustainability (Mackenthun 2021). Literary fiction can also provide counter-hegemonic models of masculinity that care about the environment and nurture it, as seen in Frederik Pohl's "The Space Merchants" (Cenamor 2021). Picture books, specifically designed to convey complex ecosystem concepts, can engage students in multimodal ways of learning and introduce eco-literacy to young readers (Muthukrishnan 2019). Another intriguing novel was written by Indonesian author Ahmad Tohari, whose works use the environment as a tangible setting and plot device. Tohari discussed the need for environmental preservation in his debut novel, "By the Foot of Cibalak Hill (Di Kaki Bukit Cibalak)", which was first published as a serialised narrative in the Kompas daily in 1979 (Yulisatiani et al. 2020).

The gap in scholarly literature at the intersection of eco-literacy and novels is the lack of focus on transition stories that narrate the rebuilding of the world amid a crisis as instruments for triggering environmental awareness (Mackenthun 2021). While there is existing research on the relationship between literature and nature, the potential for novels to serve as instruments for triggering environmental awareness has only recently caught the attention of scholars (Nayak 2021). Investigating this gap is significant because literature, particularly novels, can shape emotional and intellectual dispositions towards a sustainable transformation of society (Setyowati and Emzir 2019). Novels can enable readers to develop sophisticated understandings of social and ecological justice, and transition stories offer feasible ideas about orchestrating economic and social change (Turan Özgür Güngör 2020). By exploring the connection between humans and their environment, novels can develop an investigative ecological consciousness regarding environmental issues (Aleem et al. 2018). This research can raise awareness and inform people about the severity of environmental problems, ultimately leading to positive behavioural change.

This article undertakes an exhaustive investigation into the relationship between eco-literacy and novels, using bibliometric analysis as the investigation's cornerstone. By systematically examining the scholarly literature, this study seeks to unravel the trends, key contributors, thematic clusters, and research gaps in this nascent field. With a firm foundation in bibliometric analysis, this study strives to uncover the underlying currents that shape the discourse around eco-literacy novels and their influence on societal perceptions of the environment.

In order to attain the objective of this study, the following research questions were constructed:

1. What is the temporal trend in research output related to eco-literacy and its portrayal in novels?
2. What are the most active institutions that have contributed significantly to eco-literacy in novels to promote environmental awareness?
3. What are the prevalent thematic concepts within the field of eco-literacy as depicted in novels?
4. How has the research landscape evolved regarding author-country collaboration networks?

Method

This section examines the methodology used in the current review. The systematic steps included selecting datasets, analytical techniques, and pre-processing datasets. Our exploration of this uncharted territory is motivated by pertinent research concerns. Through a synthesis of academic rigour and a passion for advancing environmental awareness, we aim to contribute to the scholarly dialogue surrounding eco-literacy and the novels that promote environmental awareness.

Selection of datasets

This study used Scopus and Web of Science (WoS) databases to gather and analyse datasets. The databases mentioned are widely recognised as the largest repositories of abstracts and citations for scholarly research

literature globally (Nurhuda et al. 2023). The databases have consistently attracted significant usage from scholars worldwide, as evidenced by prior studies (Abdullah 2021), (Sofyan et al. 2022). Accessing and retrieving data entries from both databases and downloading the raw source datasets necessitated the possession of an institutional subscription.

The datasets in this study were searched on July 1, 2023, using a specific set of keywords: ("Eco-literacy" OR "Ecological literacy" OR "Environmental education" OR "Environmental awareness" OR "Eco-criticism" OR "Environmental consciousness") AND ("Novel" OR "Fiction" OR "Literature and environment" OR "Nature writing" OR "Ecological storytelling" OR "Green narratives" OR "Sustainable literature" OR "Eco-fiction" OR "Eco-poetry" OR "Environmental communication" OR "Ecocritics" OR "Ecopoetics" OR "Environmental themes" OR "Nature symbolism" OR "Environmental pedagogy" OR "Environmental rhetoric" OR "Eco-narratology"). The specified collection of datasets was explored within the Title, Abstract, and Keywords search field, with no language restrictions but confined to data available until December 31, 2022.

Analytical techniques

ScientoPy is a software platform that orchestrates primary study subjects, key authors, countries, and pertinent publications associated with a specific research undertaking (Abdullah and Sofyan 2023b). This considered software, founded on Python operates as a free and open-source scientometric analysis tool. It mitigates bias in individual publications through its unique pre-processing phase, as illuminated by Ruiz-Rosero et al. in 2019 (Ruiz-Rosero, Ramirez-Gonzalez, and Viveros-Delgado 2019). By adopting this methodology, individuals and potential scholars can attain improved readability, precision, systematicity, comprehensiveness, and representative findings while scrutinising extensive datasets drawn from Scopus and WoS (Abdullah and Sofyan 2023b). In this study, VOSviewer was utilised for crafting a co-occurrence map of authors' keywords and a co-authorship network centred on countries. Furnishing dependable and authoritative information on a broad array of interconnected topics and the collaborative endeavours of authors in earlier research holds paramount significance, as it has profoundly influenced the domain of eco-literacy and novel exploration on a global scale.

Pre-processing datasets

The datasets underwent pre-processing to ensure the effective amalgamation of datasets from WoS and Scopus while eliminating duplicate entries (Abdullah and Sofyan 2023b). This process resulted in the creation of a secondary dataset for subsequent analysis. With the aid of ScientoPy, the bibliographic dataset was subjected to pre-processing. In this phase, ScientoPy standardises the author's name by substituting it with a semicolon when extracting metadata from the Scopus database. Moreover, it removes dots, commas, and special characters from both databases' metadata, eliminating duplicate entries that share identical titles and authors (Pabon et al. 2020).

The data presented in Table 1 reveals that the initial outcomes of the collected data encompass 1210 raw datasets sourced from Scopus and WoS publications. It becomes evident that 78 publications (6.40%) were excluded due to the automated document-type filtering procedure. Initially, there were 1132 publications before entering the phase of duplicate removal. This investigation's overall count of duplicates amounted to 358 from both databases. In the end, 774 publications stand as valid for progression in the ongoing study, with 521 publications (67.30%) originating from WoS and 253 publications (32.70%) from Scopus. The tally of validated

datasets meets the minimum requirement for conducting bibliometric analysis, as Donthu et al. (2021) stipulated.

Table 1. Data integration and duplicates exclusion

Data Pre-processing Output	Information	Number	Percentage (%)
Initial datasets	Raw data from Scopus and WoS	1210	-
	Automatic type-filter publication to remove non-related document	78	6.40
	Total publications after selecting document types (Research articles, conference papers, book chapters, review papers, and proceedings)	1132	-
Duplicated removal results	Publications in WoS	533	47.10
	Publication in Scopus	599	52.90
	Duplicated publications in both databases	358	31.60
	Duplicated publications from WoS	12	2.30
	Duplicated papers from Scopus	346	57.80
Final datasets	Total publications after eliminating duplicates	774	
	Publications in WoS	521	67.30
	Publications in Scopus	253	32.70

Source: Authors

Results and Discussion

This part offers the findings on the four research questions specified in the introduction and comprehensively discusses their significance. The inquiries have directed the examination to understand the research patterns and trends better.

The temporal trend in research output

The temporal analysis lets us comprehend publications' temporal patterns within a dataset. The temporal trend analysis of research on eco-literacy and novels, categorised by the database utilised, is depicted in Figure 1. The provided figure presents the annual count of publications, spanning 1990 through 2022. The data is sourced from the Web of Science (WoS) and Scopus databases.

According to the data presented in Figure 1, it can be observed that there were no publications on the issue under consideration recorded in either of the databases in the year 1990. Likewise, in 1991, Scopus documented a single article, although WoS did not register any publications. Upon examining the Web of Science (WoS) database, it becomes evident that there exists a progressive augmentation in the number of scholarly articles published, commencing from the mid-1990s and persisting until around 2005. Differences in database coverage, indexing practices, and the types of sources included can contribute to the observed

discrepancies in scholarly metrics (Vanderstraeten, R. Vandermoere 2021). These differences provide insights into the dynamics of academic databases and their role in shaping the available research landscape (Burghardt et al. 2020). Therefore, understanding the factors contributing to these discrepancies is crucial for evaluating scholarly performance and making informed decisions.

Between the years 2005 and approximately 2015, there is evidence of a notable and consistent increase in publication counts, indicating an upward trend. This period may suggest an increased awareness of the significance of eco-literacy within the literature. This led to the emergence of eco-criticism as a literary theory that examines the relationship between literature and its surroundings, highlighting the interconnectedness of human-nature life (Zubenko and Sytnykova 2020). Environmental themes, such as climate change and loss of biodiversity, have gained prominence in literature and other media, reflecting the growing concern for ecology and the impact of human actions on the environment (Manugeren, Suhadi, and pardi 2020).

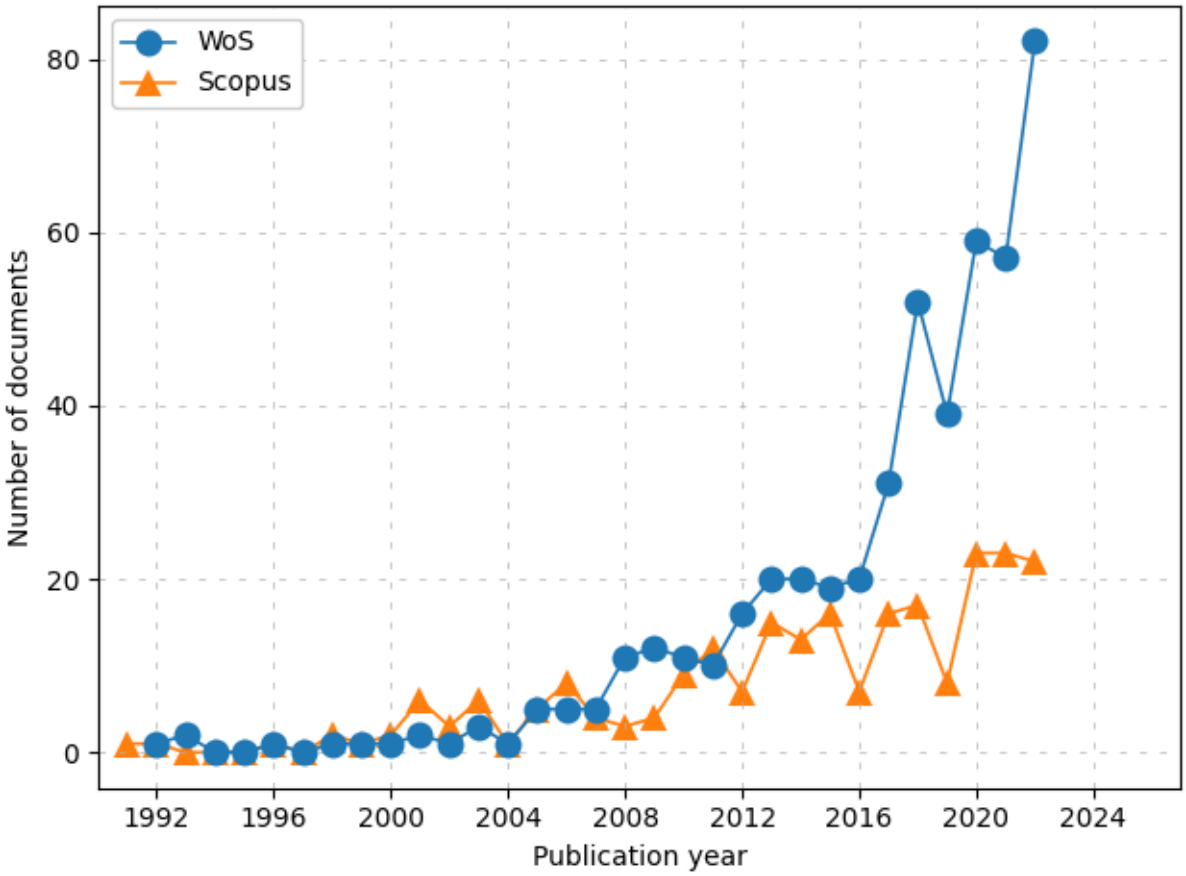


Figure 1. The temporal trend of publications. Source: ScientoPy

The years encompassing 2015 and 2016 exhibit a notable surge in research productivity across both datasets. This peak indicates a culmination of interest and intellectual involvement in the eco-literacy in novels within this specific time frame. Following 2016, although there may be minor fluctuations, the number of publications remains relatively elevated. This happened as the critical mass of researchers has gathered around the topic of eco-literacy in novels, leading to increased collaboration, idea sharing, and a surge in publications as researchers explore various dimensions of the field (Bashir 2020; Hartati et al. 2021; Nayak 2021). This was explicit that literature had played a significant role in addressing and reflecting environmental concerns,

providing a platform for conveying complex messages and values related to the environment. The enduring level of interest suggests that eco-literacy in novels has solidified its position as a significant field of study and scholarly discussion.

The most active institutions

A comprehensive map of the research landscape is created by identifying the most active institutions in this field. It provides insight into the academic centres leading the discussion and making significant contributions to the field of eco-literacy in novels. Data in Figure 2 depicted that the investigation into institutions actively engaged in eco-literacy and novel research reveals a group of leading contributors.

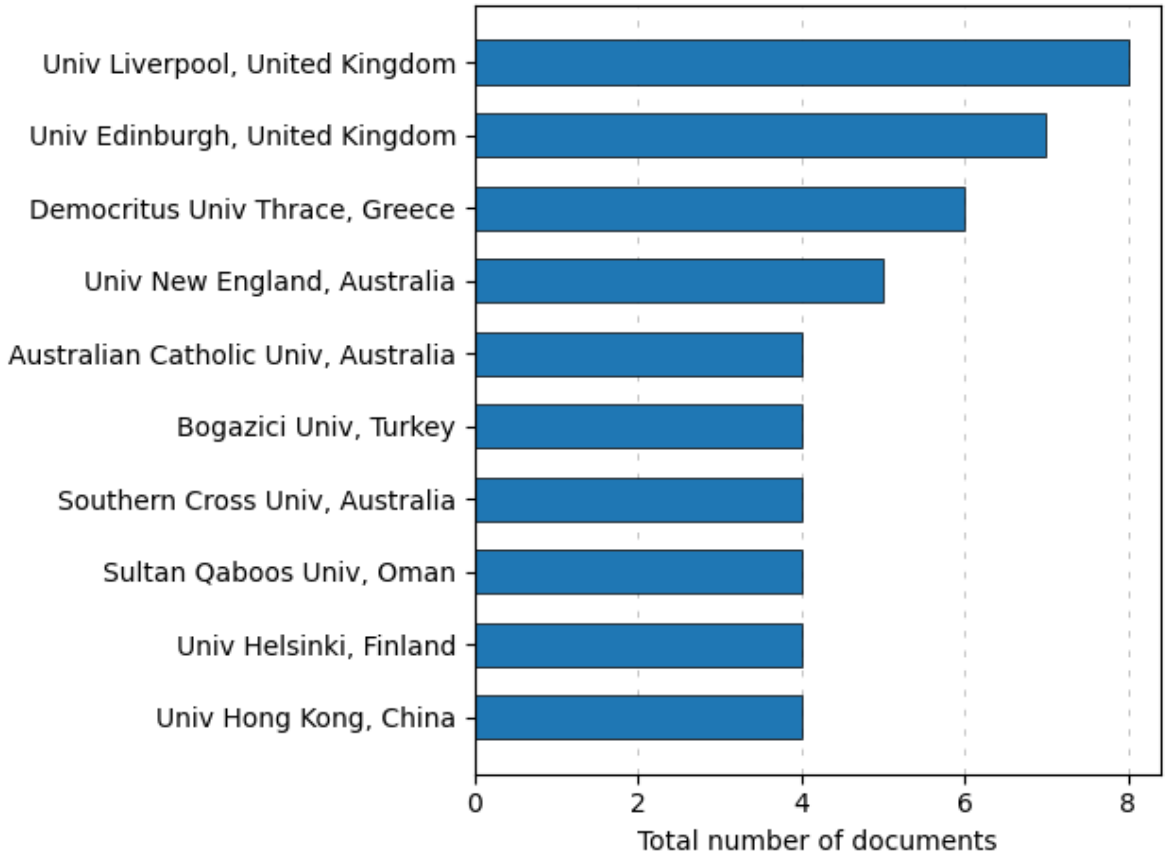


Figure 2. The top ten most productive countries. Source ScientoPy

The University of Liverpool, United Kingdom, stands out with eight publications, underscoring its substantial commitment to exploring the synergy between literature and environmental consciousness. Close behind, the University of Edinburgh, also based in the United Kingdom, showcases a robust research agenda with seven publications, reinforcing the nation's emphasis on intertwining literature with ecological awareness. Democritus University of Thrace in Greece emerges as a significant participant with six publications, reflecting the global reach of this field and its impact across diverse cultural contexts. In Australia, the University of New England garners attention with five publications, exemplifying the nation's dedication to utilising literature as a conduit for environmental education. Other Australian institutions, including Australian Catholic University and Southern Cross University, each with four publications, further amplify the nation's commitment to

fostering eco-literacy. The presence of institutions from Turkey, Oman, Finland, and China among the leaders underscores the international nature of this research, transcending borders to address environmental awareness through literary exploration.

The prominence of these institutions speaks to the international significance of research at the nexus of eco-literacy and novels. The United Kingdom's dominant presence, exemplified by the University of Liverpool and the University of Edinburgh, showcases the nation's commitment to exploring how literature can catalyse environmental consciousness (De Silva, Wang, and Kuah 2021). The inclusion of institutions like the Democritus University of Thrace and Sultan Qaboos University underscores the global nature of environmental challenges, as Greece and Oman contribute their unique perspectives. In Greece, companies have been adopting green practices and showing increasing awareness of issues related to environmental protection and sustainable production and consumption (Zavali and Theodoropoulou 2018). This indicates a growing commitment to sustainable development and addressing environmental concerns within the Greek industry sectors.

Otherwise, in Oman, efforts are focused on addressing the salinisation of agricultural lands caused by seawater intrusion. The government is implementing measures such as controlling well digging, constructing recharge dams, and promoting salt-tolerant crops to improve groundwater quality and reduce soil salinity (Chrysos-Anestis et al. 2021). These efforts highlight the importance of sustainable water management and agricultural practices in mitigating the environmental impact of salinisation. Greece and Oman demonstrate the need for international collaboration and concerted efforts to address environmental challenges and promote sustainable development.

The prevalent thematic concepts

The thematic concepts in research are intricately linked to the keywords authors employ to articulate their study. Authors frequently choose keywords that succinctly capture their research's core concepts, subjects, and focal points. The keywords mentioned offer a concise overview of the primary issues and subject matter investigated within a particular research endeavour (Sofyan et al. 2023). Researchers can navigate the scholarly terrain more effectively, contribute to ongoing dialogues, and ensure their work matches the academic community's growing interests by identifying the core concepts and themes addressed in a study. Figure 3 depicts the notion of prevalent thematic discovered since 1990 concerning research on eco-literacy in novels.

Figure 3 presents the thematic concepts explored via author keywords in research related to eco-literacy and novels. The figure also delves into the results of the top ten keywords and the percentage of publications in the last two years, 2021 and 2022 (PDLY). Based on Figure 3, the top three most used keywords are "Environmental education", "Eco-criticism", and "Environmental communication".

With 134 occurrences, "Environmental education" emerges as the most prevalent thematic concept. This keyword reflects the scholarly emphasis on utilising literature, particularly novels, to foster environmental awareness and literacy. Researchers are exploring how novels can engage readers in understanding ecological concepts, encouraging sustainable behaviours, and inspiring a deeper connection to the natural world. Based on this result, scholars recognise the power of storytelling to engage readers emotionally and intellectually, enhancing their understanding of complex ecological concepts (Bloomfield and Manktelow 2021), (Lin and Li 2018). This aligns with the broader purpose of eco-literacy research, emphasising literature's capacity to inspire sustainable behaviours and foster a deeper connection to the natural world (Curdt-Christiansen 2020).

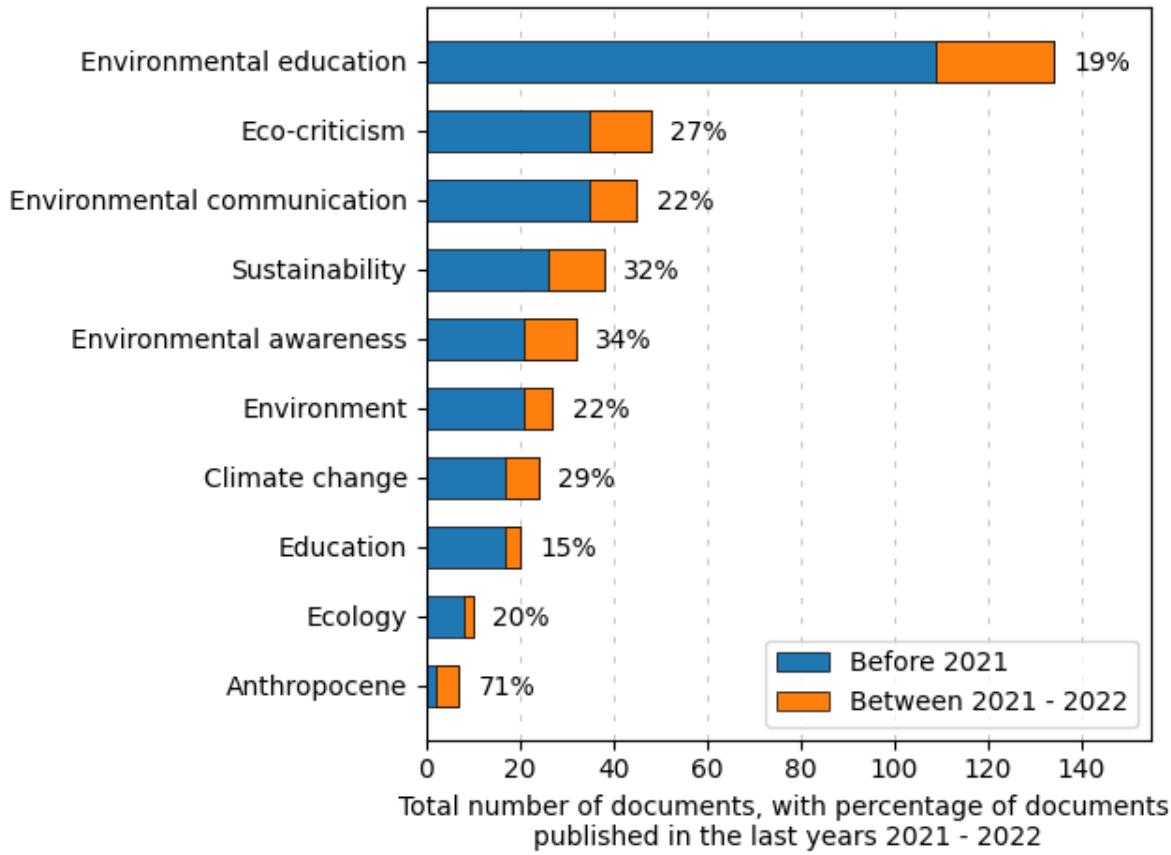


Figure 3. The bar-trend graph of the prevalent thematic concept. Source: ScientoPY

"Eco-criticism", the second most prominent keyword, highlights the scholarly inclination to analyse literary representations of environmental themes critically. This concept bridges literary and environmental studies, contributing to a multidisciplinary exploration of how narratives shape perceptions of nature, humanity, and ecological interconnectedness (Mcphie and Clarke 2023). The significance of this keyword lies in its capacity to illuminate the intricate relationship between literature and environmental consciousness, enriching our understanding of eco-literacy's multifaceted dimensions (Nabulya 2018).

The strong presence of "Environmental communication" underscores novels' pivotal role in conveying environmental messages to diverse audiences. This keyword recognises that literature can bridge the gap between scientific knowledge and public understanding, catalysing conversations about pressing ecological issues (Jeong, Sherman, and Tippins 2021). The prevalence of this concept signifies the increasing emphasis on effective communication strategies through literary narratives, amplifying the societal impact of eco-literacy research (Lorimer 2019).

The high PDLY of the top three keywords, "Anthropocene", "Environmental awareness", and "Climate change", indicated their contemporary relevance and aligned with the urgency of addressing current environmental challenges. Anthropocene represents a new epoch that has replaced the Holocene due to human activities, notably the Industrial Revolution and the subsequent Great Acceleration of Industrialization and Globalisation (Li 2021). Hence, the high PDLY underscores the field's commitment to currently understanding and addressing this epoch's challenges.

Utilising VOSviewer for mapping analysis can comprehensively comprehend the relationships and patterns among author keywords in research related to the current topic. The visualisation depicted in Figure 4 illustrates

the overlay of authors' keywords co-occurrence, considering a minimum keyword occurrence of five. As a result, among the 2462 keywords, 29 of them have met the threshold criteria.

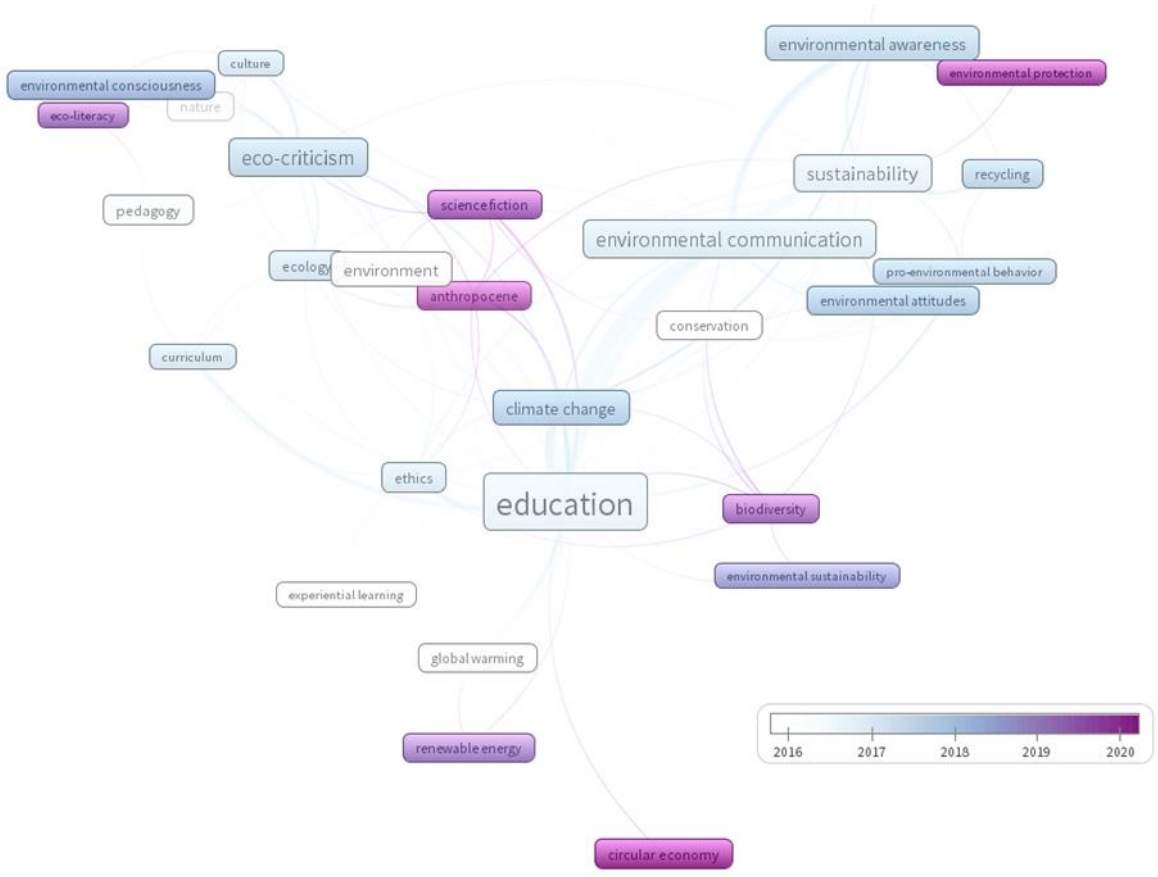


Figure 4. The overlay visualisation of authors' keywords. Source: VOSviewer

According to the findings presented in Figure 4, it is evident that the cluster denoted by the dark violet colour encompasses terms such as "eco-literacy", "science fiction", "Anthropocene", "environmental protection", "biodiversity", "renewable energy", and "circular economy". Notably, these keywords have gained prominence and preference among researchers since 2018. This observation suggests a discernible shift in research focus and interests within eco-literacy and novels. This cluster's emergence is significant, reflecting a convergence of interconnected concepts and contemporary environmental concerns. The keyword "eco-literacy" emphasises investigating how literature can promote environmental awareness and education. Scholars recognise the potential of literature, including science fiction, to facilitate eco-literacy by engaging readers in imaginative explorations of ecological scenarios (Jeong, Sherman, and Tippins 2021).

The inclusion of "Anthropocene" underscores the relevance of this concept in contemporary discourse. Researchers are likely exploring how novels, including science fiction, address the challenges and implications of the Anthropocene epoch. This aligns with recent scholarly attention to the Anthropocene's impact on literature and culture (Brookes and Fratto 2020). Other keywords like "environmental protection," "biodiversity," and "renewable energy" indicate an interest in themes directly related to ecological sustainability. Researchers are likely investigating how novels address these urgent topics, contributing to discussions on conservation, environmental ethics, and the transition to renewable energy sources.

The presence of "circular economy" suggests exploring sustainable economic models within the literary context. Scholars may examine how novels can reflect and promote circular economy principles, resonating with the broader sustainability agenda. The observed preference for these keywords from 2018 onwards highlights the field's responsiveness to contemporary global challenges and emerging discourses. This shift could signify an increased awareness of the urgency to address environmental issues through literature, aligning with the evolving societal focus on sustainability, climate change, and ecological well-being.

The research landscape evolved regarding author-country collaboration networks

The network collaboration among authors from various countries is illustrated in Figure 5. In order to carry out this analysis, the co-authorship examination was conducted using VOSviewer, with selected countries as the unit of analysis. It was emphasised that each country should have a minimum of five documents. Therefore, following the specified minimum criterion, Figure 5 illustrates a network collaboration of 36 selected author-country connections with the significant red cluster associated with nine countries (United Kingdom, Turkey, Greece, South Korea, Japan, Spain, Colombia, India, and Latvia). A concentrated cluster in the collaborative hub suggests shared interests, research agendas, and the exchange of ideas on eco-literacy and novels.

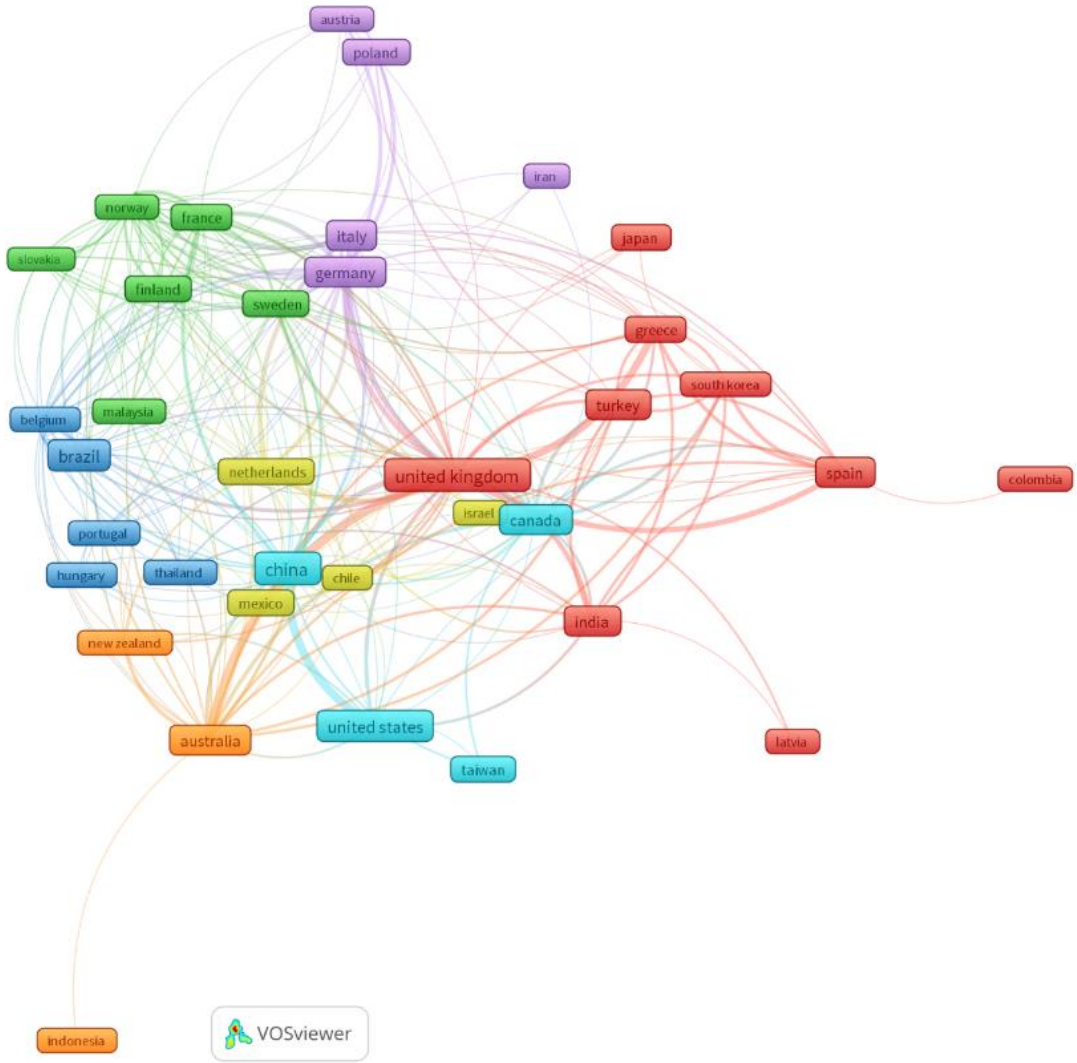


Figure 5. The network visualisation of authors-countries collaboration. Source: VOSviewer

The United Kingdom is highlighted as a central hub in network collaboration, indicating its pivotal position and contribution to the field. This may be attributed to the country's historical legacy in literature, solid academic institutions, and well-established research networks in literature and environmental studies (Paraskevopoulos et al. 2021). The global nature of this research is emphasised, transcending geographic boundaries to foster a collective exploration of the intersection between literature and environmental awareness (Shannon et al. 2021). The United Kingdom's central hub status fosters connections with researchers from diverse regions, further enhancing the collaborative network.

Conclusion

Several vital trends and dynamics have been identified and analysed in this bibliometric study focusing on eco-literacy in novels. The temporal trend analysis revealed a gradual increase in research output, especially after 2005, indicating a growing scholarly interest in investigating the relationship between literature and environmental consciousness. Notably, the years surrounding 2015-2016 witnessed an uptick in research output, culminating in intellectual engagement. The prevalence of keywords such as "environmental education", "eco-criticism", and "environmental communication" highlights the importance of literature as a tool for fostering environmental awareness, critical analysis, and effective communication. In addition, the network collaboration analysis highlighted the United Kingdom's prominent role in the field and its status as the central hub of global research networks. This review contributes to the field by comprehensively assessing temporal patterns, thematic themes, and collaborative networks within eco-literacy as portrayed in novels. It underscores the global significance of this field and its efficacy in addressing contemporary environmental issues. Educating readers and fostering environmental awareness through literary content serves as a valuable tool for addressing present-day environmental concerns.

While the analysis gives valuable information, certain limitations should be noted. The study depends heavily on bibliometric data from specific databases (Scopus and WoS), which may exclude significant publications from other sources such as CORE, Internet Archive Scholar, and ERIC. Furthermore, the study concentrates on the quantitative components of research trends and collaboration, perhaps missing out on the qualitative nuances of studies. Future research could focus on the qualitative features of publications, assessing the content, methodology, and theoretical frameworks used. Investigating the influence of eco-literacy programmes on readers' attitudes and behaviours may provide insights into the real-world implications of academic research. Furthermore, researching the impact of cultural and regional contexts on eco-literacy topics in novels could help us better grasp the field's diversity.

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References

Abdullah, Khairul Hafezad. 2021. "Mapping of Marine Safety Publications Using VOSviewer." *ASM Science Journal* 16 (July): 1–9. https://doi.org/10.32802/asmscj.2021.774.

Abdullah, Khairul Hafezad. 2023. "Time Flies, Waste Piles: A Bibliometric Analysis of Solid Waste Management Research." *Ecocycles* 9 (2): 59–70. https://doi.org/10.19040/ecocycles.v9i2.310.

Abdullah, Khairul Hafezad, and Davi Sofyan. 2023a. "Building Resilient Societies through a Holistic Approach to Disaster Management : A Perspective Article." *Journal of Metrics Studies and Social Science* 2 (1): 17–32. https://doi.org/https://doi.org/10.56916/jmsss.v2i1.499.

Abdullah, Khairul Hafezad, and Davi Sofyan. 2023b. "Machine Learning in Safety and Health Research: A Scientometric Analysis." *International Journal of Information Science and Management* 21 (1): 17–35. https://doi.org/10.22034/ijism.2022.1977763.0.

Ajidahun, Clement Olujide. 2017. "Dramatic Literature, Digitisation and Cultural Mediatisation: A Postmodernist Perspective." *OGIRISI: A New Journal of African Studies* 13 (1): 187–99. https://doi.org/10.4314/og.v13i1.10.

Aleem, Umaira, Inayat Ullah, Aziz Ullah Khan, and Afzal Khan. 2018. "War on Terra and Eco-Critical Discursivity: Analyzing the Role of Cultural Productions in Creating Eco-Consciousness." *International Journal of English Linguistics* 8 (3): 339. https://doi.org/10.5539/ijel.v8n3p339.

Bashir, Tabeeda Binti. 2020. "Tracing the Emergence and Growth of Ecocritical Language." *South Asian Journal of Social Sciences and Humanities* 01 (03): 42–49. https://doi.org/10.48165/sajssh.2020.1304.

Bloomfield, Emma Frances, and Chris Manktelow. 2021. "Climate Communication and Storytelling." *Climatic Change* 167 (3–4): 1–7. https://doi.org/10.1007/s10584-021-03199-6.

Brookes, Alec, and Elena Fratto. 2020. "Towards a Russian Literature of the Anthropocene. Introduction." *Russian Literature* 114–115: 1–22. https://doi.org/10.1016/j.ruslit.2020.07.001.

Burghardt, Kyle J., Bradley H. Howlett, Audrey S. Khoury, Stephanie M. Fern, and Paul R. Burghardt. 2020. "Three Commonly Utilized Scholarly Databases and a Social Network Site Provide Different, but Related, Metrics of Pharmacy Faculty Publication." *Publications* 8 (2). https://doi.org/10.3390/PUBLICATIONS8020018.

Cenamor, Rubén. 2021. "How Can Fiction Help Raise Ecological Awareness? Ecological Masculinities in The Space Merchants." *Palgrave Studies in the History of Science and Technology*, 433–43. https://doi.org/10.1007/978-3-030-54486-7_20.

Chrysos-Anestis, Alexandros, Charisios Achillas, Dimitrios Folinas, Dimitrios Aidonis, and Michael Chrissos Anestis. 2021. "Sensitivity of Greek Organisations in Sustainability Issues †." *Engineering Proceedings* 9 (1): 1–5. https://doi.org/10.3390/engproc2021009004.

Curdt-Christiansen, Xiao Lan. 2020. "Environmental Literacy: Raising Awareness through Chinese Primary Education Textbooks." *Language, Culture and Curriculum* 0 (0): 1–16. https://doi.org/10.1080/07908318.2020.1797078.

Ha, Changchen, Guowen Huang, Jiaen Zhang, and Shumin Dong. 2022. "Assessing Ecological Literacy and Its Application Based on Linguistic Ecology: A Case Study of Guiyang City, China." *Environmental Science and Pollution Research* 29 (13): 18741–54. https://doi.org/10.1007/s11356-021-16753-7.

Habibullah, Muzafar Shah, Badariah Haji Din, Siow Hooi Tan, and Hasan Zahid. 2022. "Impact of Climate Change on Biodiversity Loss: Global Evidence." *Environmental Science and Pollution Research* 29 (1): 1073–86. https://doi.org/10.1007/s11356-021-15702-8.

Hartati, Tatat, Eli Nurlela Andriani, Nana Supriatna, and Risma Nuriyanti. 2021. "Development of Children's Literature Book Based on Primary School Students' Ecoliteration." *Social, Humanities, and Educational Studies (SHEs): Conference Series* 4 (1): 152. https://doi.org/10.20961/shes.v4i1.48719.

Hartono, Rachman. 2020. "Evaluating Sustainable Education Using Eco-Literacy." *Habitat* 31 (2): 78–85. https://doi.org/10.21776/ub.habitat.2020.031.2.9.

Jeong, Sophia, Brandon Sherman, and Deborah J. Tippins. 2021. "The Anthropocene as We Know It: Posthumanism, Science Education and Scientific Literacy as a Path to Sustainability." *Cultural Studies of Science Education* 16 (3): 805–20. https://doi.org/10.1007/s11422-021-10029-9.

Li, Yuming. 2021. "Anthropocene: Post-Modern Thinking on Earth's Evolution History." *Academic Journal of Humanities & Social Sciences* 4 (9): 14–17. https://doi.org/10.25236/ajhss.2021.040903.

Lin, Chi I., and Yuh Yuh Li. 2018. "Protecting Life on Land and below Water: Using Storytelling to Promote Undergraduate Students' Attitudes toward Animals." *Sustainability (Switzerland)* 10 (7): 1–15. https://doi.org/10.3390/su10072479.

Lorimer, Hayden. 2019. "Dear Departed: Writing the Lifeworlds of Place." *Transactions of the Institute of British Geographers* 44 (2): 331–45. https://doi.org/10.1111/tran.12278.

Mackenthun, Gesa. 2021. "Sustainable Stories: Managing Climate Change with Literature†." *Sustainability (Switzerland)* 13 (7): 1–22. https://doi.org/10.3390/su13074049.

Manugeren, M, Jumino Suhadi, and pardi pardi. 2020. "Literature as a Medium of Exposing Social Problem through Thomas Gray's "Elegy Written in A Country Churchyard." *Journal of Language and Literature* 20 (1): 150–58. https://doi.org/10.24071/joll.v20i1.2431.

McConnell, Anne. 2020. "The Textual Ecology of Christine Montalbetti's Journée Américaine." *Humanities* 9 (4): 133. https://doi.org/10.3390/h9040133.

Mcphie, Jamie, and David A. G. Clarke. 2023. "Nature Matters: Diffracting a Keystone Concept of Environmental Education Research – Just for Kicks." *New Materialisms and Environmental Education* 26 (May): 268–85. https://doi.org/10.4324/9781003380337-18.

Mousavi, Seyed Alireza, Mohsen Sarshad Ghahfarokhi, and Saeed Soltani Koupaei. 2020. "Negative Impacts of Nomadic Livestock Grazing on Common Rangelands' Function in Soil and Water Conservation." *Ecological Indicators* 110 (September 2017): 105946. https://doi.org/10.1016/j.ecolind.2019.105946.

Muthukrishnan, Rani. 2019. "Using Picture Books to Enhance Ecoliteracy of First-Grade Students." *The International Journal of Early Childhood Environmental Education* 6 (2): 19.

Nabulya, Eve. 2018. "When Ecocriticism and Rhetoric Meet: Environmental Persuasion in Terrorists of The Aberdare." *Journal of Literary Studies* 34 (1): 61–78. https://doi.org/10.1080/02564718.2018.1447869.

Nayak, Priti Sureshkumar. 2021. "The Growth of Eco-Criticism as a Literary Theory." *Vidhyayana* 6 (6): 1–7.

Noviana, E., O. Kurniaman, N. Salwa, N. Hermita, N. Afendi, Z. Zufriady, Munjiatun, and M. Misliati. 2019. "Ecological Knowledge of Elementary School Students Through the Use of Ecoliteracy Teaching Materials in Curriculum 2013." *Journal of Physics: Conference Series* 1351 (1). https://doi.org/10.1088/1742-6596/1351/1/012071.

Nunez, Michael B, and Michael A Clores. 2017. "CORRESPONDENCE Michael A. Clores." *International Journal of Environmental and Science Education* 12 (5): 1195–1215.

Nurhuda, Nurhuda, Novri Gazali, Khairul Hafezad Abdullah, Norazlinda Saad, Edi Setiawan, and Joseph Lobo. 2023. "Retrospective of Five Years Research of School Leadership in Asia (2018–2022): A Scientometric Paradigm." *International Journal of Evaluation and Research in Education (IJERE)* 12 (3): 1390. https://doi.org/10.11591/ijere.v12i3.26350.

Pabon, Carlos David Rodriguez, Juliana Sánchez-Benitez, Juan Ruiz-Rosero, and Gustavo Ramirez-Gonzalez. 2020. "Coffee Crop Science Metric: A Review." *Coffee Science* 15 (1): 1–11. https://doi.org/10.25186/.v15i.1693.

Paraskevopoulos, Pavlos, Chiara Boldrini, Andrea Passarella, and Marco Conti. 2021. "The Academic Wanderer: Structure of Collaboration Network and Relation with Research Performance." *Applied Network Science* 6 (1). https://doi.org/10.1007/s41109-021-00369-4.

Perry, George L.W., Sarah J. Richardson, Niki Harré, Dave Hodges, Phil O.B. Lyver, Fleur J.F. Maseyk, Riki Taylor, et al. 2021. "Evaluating the Role of Social Norms in Fostering Pro-Environmental Behaviors." *Frontiers in Environmental Science* 9 (June): 1–7. https://doi.org/10.3389/fenvs.2021.620125.

Puspitasari, Ratna, and Khomarudin. 2020. "Outdoor Learning as the Development of Eco Literacy Skills in Learning Social Studies in Secondary School." In *International Conference On Social Studies, Globalisation And Technology (ICSSGT 2019)*, 458:281–89. https://doi.org/10.2991/assehr.k.200803.035.

Ruiz-Rosero, Juan, Gustavo Ramirez-Gonzalez, and Jesus Viveros-Delgado. 2019. "Software Survey: ScientoPy, a Scientometric Tool for Topics Trend Analysis in Scientific Publications." *Scientometrics* 121 (2): 1165–88. https://doi.org/10.1007/s11192-019-03213-w.

Scherer, Laura, Jens Christian Svenning, Jing Huang, Colleen L. Seymour, Brody Sandel, Nathaniel Mueller, Matti Kummu, et al. 2020. "Global Priorities of Environmental Issues to Combat Food Insecurity and Biodiversity Loss." *Science of the Total Environment* 730 (April): 139096. https://doi.org/10.1016/j.scitotenv.2020.139096.

Setyowati, Nanik, and Emzir Emzir. 2019. "Enviromental Insight in Ucil the Mouse Deer Fairy Tale Collection Written By Tria Ayu K (an Ecocritic Study)." *BAHTERA : Jurnal Pendidikan Bahasa Dan Sastra* 18 (1): 107–12. https://doi.org/10.21009/bahtera.181.010.

Shannon, Jerry, Katherine B. Hankins, Taylor Shelton, Amber J. Bosse, Dorris Scott, Daniel Block, Heather Fischer, et al. 2021. "Community Geography: Toward a Disciplinary Framework." *Progress in Human Geography* 45 (5): 1147–68. https://doi.org/10.1177/0309132520961468.

Silva, Muthu De, Pengji Wang, and Adrian T.H. Kuah. 2021. "Why Wouldn't Green Appeal Drive Purchase Intention? Moderation Effects of Consumption Values in the UK and China." *Journal of Business Research* 122 (March 2019): 713–24. https://doi.org/10.1016/j.jbusres.2020.01.016.

Sofyan, Davi, Khairul Hafezad Abdullah, Ejiro Uriri Osiobe, Indrayogi Indrayogi, Rajip Mustafillah Rusdiyanto, Novri Gazali, and Yohanes Touvan Juni Samodra. 2023. "Sport and Religion: A Mapping Analytical Research." *International Journal of Public Health Science (IJPHS)* 12 (3): 1302. https://doi.org/10.11591/ijphs.v12i3.22728.

Sofyan, Davi, Yudha Munajat Saputra, Juntika Nurihsan, Nurlan Kusmaedi, and Khairul Hafezad Abdullah. 2022. "Stance of Sports and Fitness: A Scientometric Review." *Physical Education Theory and Methodology* 22 (4): 596–607. https://doi.org/10.17309/tmfv.2022.4.20.

Turan Özgür Güngör. 2020. "Vengeance of Nonhuman Beings: An Ecocritical Reading of Samuel Taylor Coleridge' Work, 'The Rime of the Ancient Mariner.'" *International Journal of Social, Political and Economic Research* 7 (2): 359–71. https://doi.org/10.46291/ijospervol7iss2pp359-371.

Turchet, Luca, and Jhonny Hueller. 2020. "Promoting Awareness on Sustainable Behavior Through an AR-Based Art Gallery." *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* 12243 LNCS (August): 53–65. https://doi.org/10.1007/978-3-030-58468-9_4.

Turney, Chris, Anne Gaelle Ausseil, and Linda Broadhurst. 2020. "Urgent Need for an Integrated Policy Framework for Biodiversity Loss and Climate Change." *Nature Ecology and Evolution* 4 (8): 996. https://doi.org/10.1038/s41559-020-1242-2.

Vanderstraeten, R. Vandermoere, F. 2021. "Inequalities in the Growth of Web of Science." *Scientometrics* 126 (10): 8635–51. https://doi.org/10.1007/s11192-021-04143-2.

Williams, Emma. 2018. "Language's Grace: Redemption and Education in J.M. Coetzee's Disgrace." *Journal of Philosophy of Education* 52 (4): 627–41. https://doi.org/10.1111/1467-9752.12326.

Yao, Chunlin. 2019. "An Investigation of Adult Learners' Viewpoints to a Blended Learning Environment in Promoting Sustainable Development in China." *Journal of Cleaner Production* 220: 134–43. https://doi.org/10.1016/j.jclepro.2019.01.290.

Yulisatiani, Septi, Sarwiji Suwandi, Suyitno, and Slamet Subiyantoro. 2020. "Sustaining the Environment: The Wisdom of Banyumas Women in Ahmad Tohari's Novels." *Rupkatha Journal on Interdisciplinary Studies in Humanities* 12 (1): 1–11. https://doi.org/10.21659/rupkatha.v12n1.19.

Zavali, Maria, and Helen Theodoropoulou. 2018. "Investigating Determinants of Green Consumption: Evidence from Greece." *Social Responsibility Journal* 14 (4): 719–36. https://doi.org/10.1108/SRJ-03-2017-0042.

Zubenko, Svitlana, and Yuliia Sytnykova. 2020. "Literature as a Reflection of Societies' Challenges." *Postmodern Openings* 11 (1Sup2): 196–205. https://doi.org/10.18662/po/11.1sup2/152.