







Comprehensive overview of research trends of environmental attitudes and awareness

Odina R. Jamoldinova¹ , Begzod K. Khodjaev^{2*} , Munojat K. Tashibekova³ ,
Marina B. Urazova² , Zhetkerbay S. Otepbergenov⁴ , Zamira K. Kurbaniyazova⁵ 

¹ Department of Psychology and Sociology, Alisher Navoi Tashkent State University of the Uzbek Language and Literature, Tashkent, UZBEKISTAN

² Department of Pedagogy, National Pedagogical University of Uzbekistan, Tashkent, UZBEKISTAN

³ Department of Pedagogy, Namangan State University, Namangan, UZBEKISTAN

⁴ Department of Digital Technologies, Informatics, and Robotics, Nukus State Pedagogical Institute, Nukus, UZBEKISTAN

⁵ Department of Primary Education, Nukus State Pedagogical Institute, Nukus, UZBEKISTAN

Received 01 April 2026 • Accepted 23 May 2026

Abstract

Environmental attitudes and awareness are very critical in determining the conduct of people and the society in the management of the environment. It is crucial to comprehend these attitudes as well as factors affecting them to design adequate measures for increasing consciousness of the environment. Currently, this manuscript provides a systematic bibliographic review of environmental attitudes and awareness based on the Scopus database which encompasses 63 articles within the 2010-2024 period. Environmental attitudes are now recognized as having a central role to play in addressing environmental problems, which explains the growing scholarly interest in this area. Using data from the past fourteen years, the study highlights the leading authors, countries, institutions, and funds involved in research to offer information on the geographical distribution of the research activity. The geographical locations of the published articles also reveal areas of higher research productivity depending on the capability of the regions in terms of academic and research activities. To date, some of the best-ranked universities have revealed themselves as the pioneer universities because they consistently generate significant research outputs in this field. Funds for research have been made from several national and international bodies which have worked as a backbone to the studies and helped in yielding the results. The results of this bibliometric analysis thus provide relevant information regarding the state of research literature on environmental attitudes and awareness. The said trends and patterns form a basis for future research agenda and the creation of better strategies for enhancing the appreciation and embrace of environmental issues. Thus, understanding the factors that determine environmental attitude and behavior can assist people and communities in making better choices for a sustainable environment.

Keywords: environmental attitudes, environmental awareness, bibliometric analysis

INTRODUCTION

Environmental attitudes, behavior, affect and awareness are among the most studied topics in environmental education (Goulgouti et al., 2019; LeSage-Clements et al., 2024; Perera et al., 2024). Environmental attitude focuses on the sentiments that people have,

pertaining to the environmental system, and which dictates their action and choices relating to environmental matters (Hastürk et al., 2023; Karavin et al., 2023). Conversely, environmental concern can be defined in terms of how informed a person is about environmental problems, the system linking people and the environment, and outcomes resulting from people's

© 2026 by the authors; licensee Modestum. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>).

✉ odinakhonjamoldinova1970@gmail.com ✉ yaxshifarzand@mail.ru (*Correspondence)

✉ toshbekovamunajat8311@gmail.com ✉ Marina-20053@yandex.ru ✉ 3508766@mail.ru ✉ 3892540@mail.ru

Contribution to the literature

- This study fills the literature with a systematic bibliometric analysis of the research on environmental attitudes and awareness from 2010 to 2024, covering 63 articles found in Scopus, and one of the most comprehensive and recent maps of this area of research.
- It contributes to the current knowledge of the field by highlighting the most important authors, countries, institutions and funding sources that have published on the topic of environmental attitude and uncovering the geographic spread and the structure of environmental attitude production.
- It sheds light on the current state of the literature, highlighting literature trends and patterns and forming the basis for future studies and action plans to promote individual and societal pro-environmental behavior through environmental awareness.

interactions with their environment (Firmanshah et al., 2023). Analysis of research has postulated that beliefs and knowledge about the environment can easily fit into the solutions of environmental problems like pollution, climate change, and strongly contribute to pro-environmental behaviors (Herdiansyah et al., 2022). Changing environmental attitudes and perceptions of diverse groups of people, including students' groups, have been identified. Engaging other communities is a crucial element towards developing an adequate sense of responsibility for environmental maintenance and improving environmentally responsible behaviors and practices that help in achieving improved standards of health and cleanliness of the total environment (Aberšek, 2022).

Regarding environmental matters and societal commitment to sustainable solutions, environmental attitude and awareness are vital. Research has revealed that people's environmental consciousness and perceptions fall under variance in preservice teachers (Orbanić & Kovač, 2021), citizenry of City Yazd in Iran (Mihanpour et al., 2020), and nursing students in Turkey (Karavin et al., 2023). In some groups, people are inclined to exhibit a high degree of environmental consciousness and even optimism towards the natural environment and the promotion of sustainability. Demographic characteristics like age, education, employment, and income would affect the extent of people's awareness and sensitivity to environmental matters and concerns (Mihanpour et al., 2020). The extension of environmental education, enhancement of capacity and knowledge, and the application of innovative approaches in teaching are recommended as ways of raising environmental consciousness and promoting sustainable activities among community center users (Herdiansyah et al., 2022). More studies have to be conducted to determine the impact of such advocacy activities like Earth Hour on the community's standpoint and/or concern on environmental matters (Kountouris, 2022).

Environmental attitudes, as the given set of variables suggests, pertain to a particular subject, namely the environment, and describe people's perceptions, priorities, and expectations regarding their protection

and preservation. In light of these, studies have pointed out that environmental attitudes are critical in the prediction of pro-environmental behaviors, and there is more emphasis on the perceived attitudes than perceived efficacy in determination of environmentally friendly behaviors (Miller et al., 2022). Researchers have established a variety of valid instruments to capture environmental attitudes. Environmental attitudes can, therefore, be conceived of as multi-faceted having facets such as love for nature, the extent of environmental concern, the degree of preservation, the extent of personal conservation and activism (Chouhan & Bhatnagar, 2017). Studies have demonstrated that the level of awareness of environmental issues among primary school learners is high. Those areas of interest include life in nature, recyclable source of energy, and environmental stewardship implying that there is need to develop educational programs aimed at improving environmental awareness and attitude from the early ages (Urban & Kaiser, 2022). In turn, environmental psychology contributes greatly toward studying the relationship between individuals and their surroundings, factors, comprising perception, knowledge, attitudes, and behaviors toward constructing sustainable socio-economic systems (Miklós, 2020).

Perceptions of the environment have a significant influence on people's behavioral change towards positive environmental behavior. Research shows that the environmental concern is significantly related to environmental sensitivity and active involvement in pro-environmental practices like energy saving and recycling (Hong & Park, 2018). Furthermore, people possessing prosocial, collectivistic, and biospheric values are expected to exhibit environmental behavior, therefore, there is an existing relationship between the personal values and environmental behavior (Bakar et al., 2020). However, several assessments show that while people hold positive beliefs and intentions about environmental protection and the sustainable use of natural resources, there is a significant discrepancy between these professed beliefs and actual behaviors; hence, people's attitudinal characteristics alone have limited influence on the translation of beliefs into action

(Walczak et al., 2021). Thus, although the beliefs about the environment are crucial in explaining actual behavior, other variables like values, context, and social sensitivity also have major impacts on the efficiency of attitude as a predictor of behavior for the case of pro-environmental actions.

LITERATURE REVIEW

Of particular importance are factors regarding environmental attitudes and consciousness in influencing people's behaviors in promoting environmental enhancement. The research also revealed that the farmers' environmental perception plays a major role on the extent of involvement in improving the rural residential environment, the higher degree of cognition of environmental problems enhances pro-environmental behavior (Qing et al., 2021). Also, data shows that there is the interaction of environmental awareness and altruism, which underlines the effectiveness of employing indices of environmental awareness in calculating altruistic actions (Aruga, 2020). Lastly, the relationship between awareness and individual attitudes and the change towards the sustainable transport modes has been discussed, stressing the long-term effects of rational choices on travel decision making (Sottile et al., 2017).

Furthermore, educational activities are considered as necessary for raising awareness about the environment and developing the positive attitude to environment and thinking among young people based on the research in the framework of the social learning theory (Ata, 2018). Last of all, acceptance of environmentally friendly policies by individuals is determined by environmental knowledge as well as trust on not-for-profit organizations, hence underlining the role of these variables when it comes to the formulation of environmental policies (Davino et al., 2019).

A literature review on students' environmental attitudes and awareness reveals various changes and trends in the recent past. It was noted that the increase of theoretical differentiation and the increase in the number of discussions around environmental attitudes and behaviors was observed after the year 2000, prominently backed by socio-psychological explanatory frameworks (Telesiene & Hadler, 2023). Moreover, fiction literature that focuses on climate change to a significant degree suggests that the world is interested in the portrayal of environmental issues through the style of fiction, proving the potential of the narrative to be powerful in delivering environmental persuasions (Schneider-Mayerson et al., 2020). Furthermore, as the historical and sophisticated concept in postsecondary education, ecocriticism has expanded the role of the evaluation based on literary works along with the range of texts just outside of the nature writing. It is connecting them to the matters of the significant cultural and climate change,

taking into consideration different trends in the sciences, the social sciences and the philosophy (Alexander, 2019). These trends reveal the changes in the focus of the concerns about the environment that contributes to the sophistication of the analysis of environmental attitudes and awareness in literature.

Gender and culture also have a noteworthy impact on environmental views as people are aware of the required strategies to address the losses. It has been established that due to differences in culture, different attributes and different values are attached to nature (Kloek et al., 2017). Religious or spiritual attributes associated with natural resources help in either increasing or decreasing the risk perception thereby influencing conservation programs (Sachdeva, 2016). Culture affects the degree of concern for the environment, risk assessment, and willingness to act in the best interest of the environment as conceptualized by the proposed psychological universals such as future self-thinking and self-transcendence (Milfont & Schultz, 2016). Local inhabitants and their traditional practices of living in relation to the environment should be embraced in environmental programs for the improvement in the developments of these infrastructures as has been experienced through the people of Anyinam in Ghana (Adom, 2017). Moreover, culture can impact environmental actions and attitudes. For instance, collectivism culture reduces an individual's power to initiate actions pertaining to the environment (Waylen et al., 2012).

At the same time, different environmental attitudes and awareness are determined not only by cultural, social and economic factors but also realization that environmentalism is shaped by the society one grows up in, its values, beliefs and underlying norms. The influence of demographic variables such as age and location on environmental perception outweighs the impact of sociocultural factors such as profession or sources of environmental information (Sales et al., 2023). Parents' values, social environment factors, and personal ecological values contribute towards pro-ecological attitudes with older, better educated parents living in cities being more likely to show a pro-environmental attitude (Jančius & Gavenauskas, 2022). Education level, upbringing and local community are social factors that affect the development of ecological consciousness among college graduates who however still appreciate these factors to be decisive for their environmental thinking (Djuric, 2022). Moreover, socioeconomic background, family's education level as well as school initiatives concerning environment education have an impact on students' attitude and action towards environment. Thus, it indicates the significance of these economic-social aspects for encouraging pro-environmental actions (Mónus, 2022).

METHODOLOGY

The decision to employ Scopus database stemmed from the fact that it indexes an impressive number of scientific sources in various fields, which makes it suitable to conduct a bibliometric analysis of literature devoted to the investigation of the theme of environmental attitudes and awareness. The search string was constructed using the following keywords and Boolean operators: (“environmental attitudes” OR “environmental awareness”) AND (“bibliometric analysis” OR “bibliometric review” OR “systematic review”). These terms were identified through a preliminary review of the existing literature and further validated through expert consultation to ensure comprehensive and accurate coverage of the target research domain. An extensive search was performed in the Scopus database by entering these keywords to identify articles published between 2010 and 2024, corresponding to current research trends. The search was applied to titles, abstracts, and keywords of publications. An initial database search produced 74 publications. The article selection process followed a systematic screening procedure. The inclusion criteria were as follows:

- (1) peer-reviewed journal articles,
- (2) articles published in English,
- (3) articles published within the 2010-2024 timeframe, and
- (4) studies directly addressing environmental attitudes and/or environmental awareness as a primary subject of investigation.

The exclusion criteria were:

- (1) conference papers, editorials, and book reviews,
- (2) articles not written in English,
- (3) publications falling outside the designated time frame, and
- (4) studies that did not focus on environmental attitudes or awareness as a core theme.

Application of these criteria resulted in the removal of 11 records, yielding a final corpus of 63 articles for analysis. Ergo, bibliometrics analysis and research quantitative instruments were used to attain systematic and expansive information on studies of environmental attitude and awareness. The most frequently used indices in the publications included frequency analysis over time and identification of journals with high output. This included evaluating the rate of annual new publications, the part that countries played and the place that institutes occupied.

This paper also included a co-authorship network analysis since the goal was to map the co-authorship relations between the researchers. This entailed graphing of the authors based on their interaction profile whereby the number of publications co-authored defines

the interaction between authors. The collaboration network was examined based on degree centrality, betweenness centrality, and clustering coefficient. In order to compare the relation of different countries, the concept of co-occurrence analysis was used to determine the different themes of research present within the literature. An acquaintanceship network was developed to identify relations among keywords and to outline trends in the form of a map with the help of resources such as VOSviewer. Scopus was used to gather data and preliminary dataset curation, while MS Excel was used for data analysis and graphic presentation. The methods used were intended to give a holistic view of the research, main publications, and cooperation within the field of environmental attitudes and awareness from the bibliometric perspective.

RESULTS

Annual Distribution of Articles and Their Citations

The annual distribution of articles and citations from 2014 to 2024 reflects the evolving pattern of research productivity and scholarly impact in the field. In 2014, only 2 articles were published, receiving 52 citations in total. This declined to 1 article in 2015, while the citation count remained stable at 53. Output recovered in 2016 with 4 articles and 86 citations, followed by a slight dip to 2 articles in 2017 (84 citations). A notable acceleration began in 2018, when publication output rose to 7 articles and citations climbed to 102, signaling growing recognition of the field. This momentum continued through 2019 (5 articles, 167 citations) and 2020 (5 articles, 193 citations), with steadily rising citation counts indicating that earlier publications were gaining wider scholarly uptake. The years 2021 and 2022 maintained consistent output (5 and 6 articles, 233 and 280 citations, respectively), while 2023 marked the peak of both productivity and impact with 9 articles and 356 citations. Although 2024 recorded 6 articles with 209 citations, the strong citation figure for such recent publications suggests that current research is rapidly attracting scholarly attention. Taken together, these findings reveal a clear upward trend in both research productivity and cumulative impact over the study period, consistent with the growing global interest in environmental attitudes documented in the broader literature (Figure 1).

Analyzing Authors' Publication Rates Over Time

The data on individual author contributions reveal that Gündüz is the most prolific contributor among the authors identified in this dataset, having authored two publications, while all other listed authors contributed one article each. Although the dataset is limited in scope, this pattern may reflect differences in research focus, institutional resources, or career stage among the

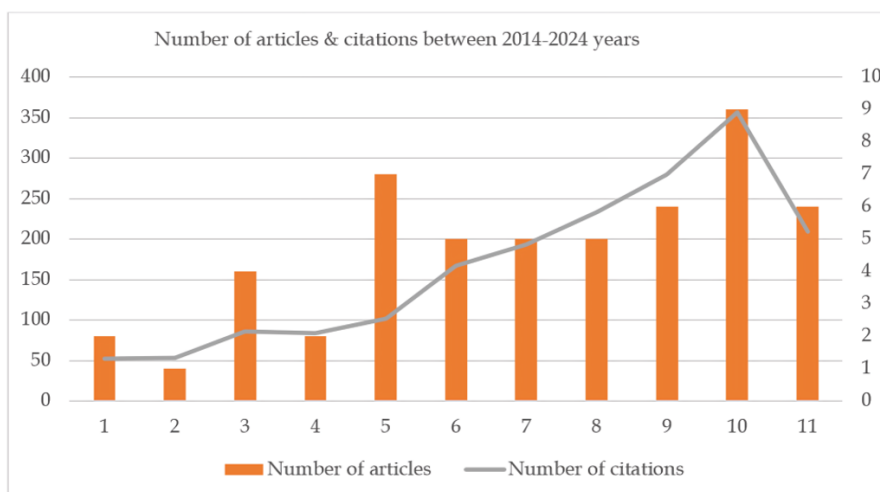


Figure 1. Number of articles and citations over years (the authors' own elaboration)

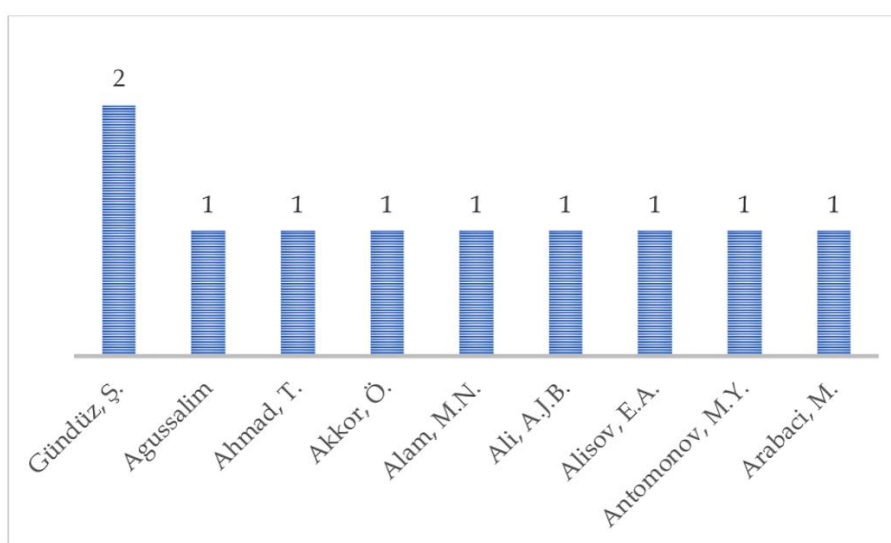


Figure 2. Number of articles by authors (the authors' own elaboration)

contributors. It should be noted that a definitive assessment of individual research productivity requires a broader dataset; the present findings offer a preliminary snapshot of authorship dynamics within this specific body of literature.

Factors that may influence individual publication rates—including area of specialization, years of research experience, and access to funding—warrant further investigation, as a deeper understanding of these variables would shed light on the structural determinants of research productivity in this field (Figure 2).

Figure 3 points to the affiliation and correlation of authors with their co-authored articles. The attributes of the nodes include the number of articles that the authors have each published, while the thickness of the edge is the number of papers they co-authored. What can be observed from the graph analyzed is that there are certain authors and some of them have co-authored with many other authors and some of them have only their own individual articles. This information can be used to

also locate possible cooperation partners and to get an impression of the structure of the research community. Taken as a whole, this network graph is an effective tool for creating an impression of the authors/users and their positioning concerning research in the academic domain.

Annual Publication Rates by Affiliations

An examination of institutional affiliations reveals that Universiti Sains Malaysia, Yakin Doğu University, Tzu Chi University, Pontificia Universidad Católica del Perú, and CENTRUM PUCP Escuela de Negocios each contributed 2 articles, reflecting a consistent level of research engagement in this domain. This pattern suggests that these institutions possess research units or academic programs with a dedicated focus on environmental topics. By contrast, New Era University College, SDU University, and Government College of Management Sciences each contributed one article, which may indicate that environmental attitudes research is an emerging rather than an established

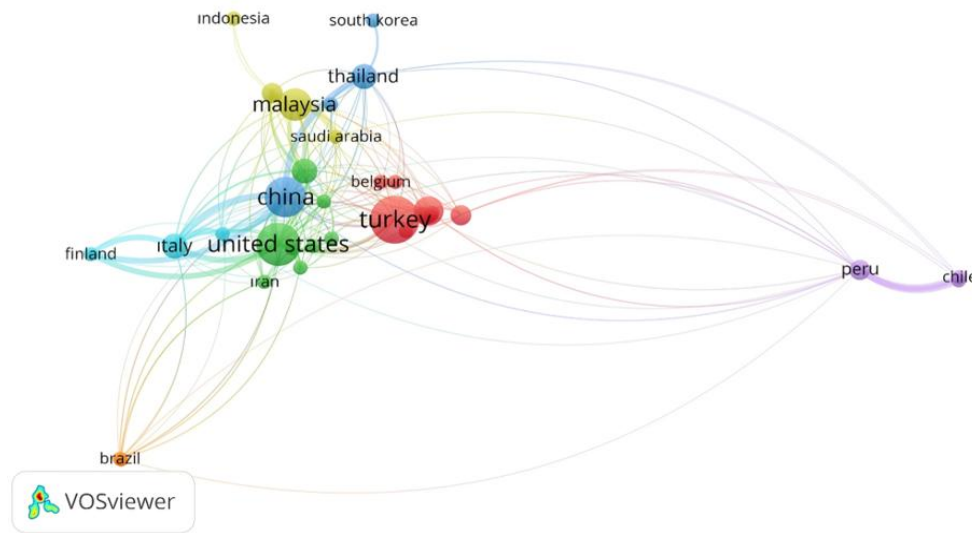


Figure 6. Global network of co-authorship relationships between researchers (the authors’ own elaboration)

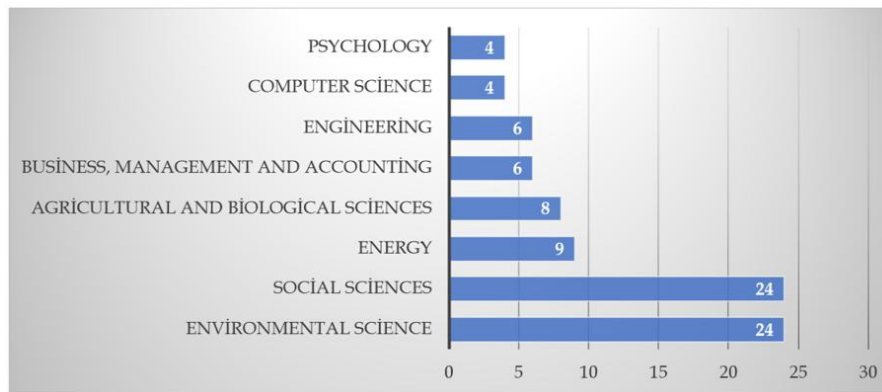


Figure 7. Number of articles by subject areas (the authors’ own elaboration)

Figure 6 presents a global network of co-authorship relationships between researchers. The first map illustrates the region distribution of researchers. The highest number of researchers was presented by Asia’s scholars followed by European and North American researchers. African and South American researchers and researchers from Oceania are presented in a lower number. Through the network graph of the researchers, one can perceive how the individuals from various zones are interconnected. These are the Asian researchers followed by the European and North American researchers in terms of networking. African, South American, and Oceanian scholars are less connected. It might also be useful for finding the cooperation partners and the geographical distribution of the research activity worldwide. In other words, this image may help in enhancing the knowledge of the global structure of the relations among researchers based on co-authorship.

Tracking Scholarly Publications by Subject Area Over the Years

The distribution of publications across subject areas reveals a gradual broadening of disciplinary engagement over the study period, which may be

attributed to the growing number of researchers entering this domain, increased availability of research funding, and advances in knowledge dissemination channels.

As illustrated in Figure 7, environmental science and social sciences are the most represented disciplines, each accounting for 24 publications, underscoring the inherently interdisciplinary nature of environmental attitudes research. These are followed by energy (9 articles), agricultural and biological sciences (8 articles), and several additional subject areas with 6 or fewer publications each. Tracking the publication counts within each subject area over time provides a valuable indicator of shifting scholarly priorities: an increasing number of publications in a given field signals rising academic interest, while a declining count may indicate that the topic is maturing or consolidating. The dominant position of environmental science and social sciences in this dataset is consistent with the recognition that understanding environmental attitudes requires integrating both natural and behavioral science perspectives. The subject area data presented here can therefore inform decisions by policymakers, funding bodies, and curriculum designers seeking to allocate

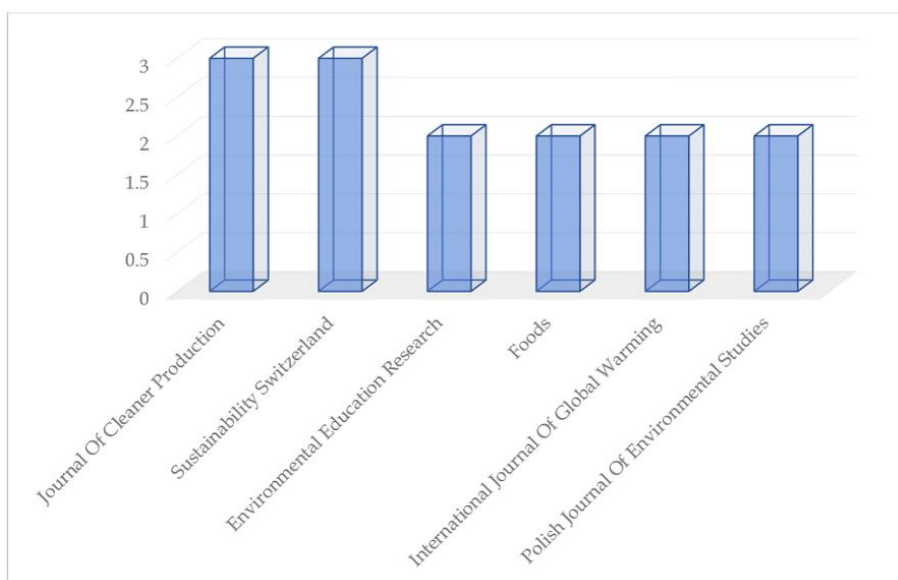


Figure 8. Distribution of number of articles over journals (the authors’ own elaboration)



Figure 9. Number of articles funded by sponsors (the authors’ own elaboration)

resources in alignment with emerging research needs (Figure 7).

Yearly Shifts in Article Counts Across Journals

Figure 8 presents the annual distribution of publications across the journals included in the dataset. The Journal of Cleaner Production and Sustainability (Switzerland) each contributed 3 articles, making them the most represented outlets in the corpus. Environmental Education Research, Food, the International Journal of Global Warming, and the Polish Journal of Environmental Studies each accounted for 2 articles. The variation in publication counts across journals reflects differences in disciplinary scope and editorial focus and indicates that research on environmental attitudes is disseminated across a relatively diverse range of scholarly outlets rather than being concentrated in a single dominant journal. This spread may be considered a positive indicator of the field’s cross-disciplinary reach.

Funding Sponsors’ Impact on Research Through the Years

The data on funding sponsors demonstrate the diversity of financial support underpinning research in this field. The National Natural Science Foundation of China stands out as the most active funder, supporting 3 articles, which reflects China’s institutional commitment to environmental science research. The Biotechnology and Biological Sciences Research Council funded 2 articles, demonstrating notable engagement from biological science funding bodies. Additional sponsors—including the College of Science, Sungkyunkwan University, ESRC, the Educational Foundation of America, and fundamental research funds for central universities—collectively illustrate the varied and geographically dispersed nature of research sponsorship in this domain. These patterns suggest environmental attitudes research benefits from a broad and pluralistic funding base that spans multiple countries and disciplinary remits (Figure 9).

DISCUSSION AND CONCLUSION

This study analyzes the findings across several dimensions of research and publication patterns in the field of environmental attitudes and awareness. The article counts and citation data indicate that research activity has been gradually rising over the years, as reflected in the annual distribution of publications. Starting from 2014, there was a mere production of 2 articles that received 52 citations, the subsequent years saw fluctuations in terms of the publication and citations scored as depicted below as in the study of Firmanshah et al. (2023). To begin with, it is essential to notice some patterns in the structure of the articles and citation increase, including the number of articles: 9 in 2023 and the number of citations: 356 in 2023, indicating activity inside the research community similar to the study of Drimili et al. (2019). This trajectory presents the topic under study as increasing significance and recognition, which can be seen through the continuously increasing literature and influence on other studies.

Analyzing author contributions is useful when comprehending the productivity of certain authors in the field of research. Among the identified authors, Gündüz stands out as a notably more prolific contributor than the others listed in this dataset. This observation raises the concept of authors' efficiency, meaning authors' performances and the differences in their productivity depending on the specialization, work experience, and funding supporting the results of Aberšek (2022). The consideration of these factors could give more understanding of the processes occurring in an area and how authors collaborate to conduct and publish their research.

This discussion of institutional affiliations provided a basis for underlining their significance to publication rates. Establishments like Universiti Sains Malaysia and Tzu Chi University reveal steady academic production and research activities indicative of their interactions and input to extant knowledge as in the study of Azhar et al. (2022). On the other hand, the institutions that produce fewer publications may tend to present different focus or issues related to the production of research publications. This concentration of output among a limited number of institutions suggests that research on environmental attitudes remains largely anchored within universities that have established environmental education programs and dedicated research units. In comparison with broader bibliometric studies of environmental science (e.g., Drimili et al., 2019), the institutional base for environmental attitude research appears considerably narrower, pointing to an opportunity for expanding participation across a more diverse range of academic institutions globally. Such institutional diversification could enrich the field by introducing new contextual perspectives and methodological approaches. These dynamics help in

comprehending the other aspects of institutions' involvement in advancing knowledge and research in the scholarly community.

Trends in the publication of research articles by countries over the decades paint the picture of the emerging global research environment. The USA, the UK, and Germany have remained top performers on the subject due to enhanced research culture and depth impelling impact on world knowledge. This sustained dominance can be attributed to well-developed academic infrastructures, robust national research funding systems, and the early institutionalization of environmental studies as an academic discipline in these countries. At the same time, newly developing states, such as Turkey, China, and Malaysia, contribute more, which indicates the developed research activities and cooperation with more developed countries as similar to the study by Davino et al. (2019). Turkey's emergence as the leading contributor in this specific domain is particularly noteworthy and may reflect the increasing integration of environmental attitudes as a research focus within Turkish higher education and teacher training programs over the past decade. The growing contributions from China and Malaysia are consistent with broader bibliometric trends observed in environmental and sustainability research (Drimili et al., 2019; Telesiene & Hadler, 2023), signaling a meaningful eastward shift in global research production that carries implications for how international funding bodies and editorial boards should engage with these emerging academic communities. The results here show the network analysis of co-authorship relationships, which reveals collaboration patterns among researchers in various parts of the world. The visual representation of such networks shows the different level of coupling between researchers in different continents, where Asian researchers are more interconnected with each other than European and North American researchers. Besides, this geographical view assists in recognizing potential partnership points and mapping the geography of research networks.

Lastly, observing the number of publications obtained by scholarly journals by years and by subjects shows the shift in scholars' focus and concerns. First, environmental science and social sciences stand out as the most popular subjects and their topics dominate the identified sources, which may indicate important and pressing global issues as stated by Orbanic and Kovač (2021). This disciplinary concentration is consistent with findings from previous bibliometric studies in related environmental fields (Drimili et al., 2019; Telesiene & Hadler, 2023) and reflects the inherently interdisciplinary nature of environmental attitude research, which draws simultaneously on psychological, sociological, and ecological frameworks. The dominance of environmental science and social sciences also suggests that researchers increasingly recognize that

behavioral and attitudinal dimensions of environmental issues cannot be addressed without integrating natural and social science perspectives. This data proves useful for identifying the changes in the focus of research over time and making further decisions concerning financing and curriculum development.

Overall, the analysis of several dimensions of these scholarly publication trends proves useful for understanding the emerging patterns of research productivity, collaboration, and research output impact. Such contributions not only extend academic learning but also guide the purposive actions of politicians, financiers, and scholars who wish to progress knowledge and solve global issues.

Implications and Future Directions

This section presents the implications arising from the analysis of the number of articles, citations, author's contributions, institutional collaborations, country tendencies, co-authorship networks, and shifts in publication emphasis. In addition, it defines further research prospects regarding these findings in the future. Use and frequency of articles and citations in the respective years augment the trends of research activity and the influence of the studied field. The increase in the number of published articles and citation rate testifies to the increased value and recognition of the topic proving its shift in importance in the academic field. Taken collectively, the trend in this type of research implies that increased work in this domain is possible to expand subsequent findings and contribute to the development of the subject domain. Future research could expand that knowledge more by analyzing the potential causes for this rising productivity level. Studying sources of incentives, existing and prospective, including funds, organizational backing, and tradition, could help paint a better picture of the processes governing researchers' performance and productivity changes over time. This work also reveals the differences of authors' yearly productivity, and publication output due to institutional connections. Understanding the efficiency of the authors and the cooperation patterns allows gaining deeper insights into the dynamics of research communities. Knowledge of these dynamics can help in designing processes that may enable the creation of better interconnected institutions, disciplines, and individuals and thus create the ideal environment for developing better impact producing research. Perhaps, the subsequent studies might aim at investigating the effects of interdisciplinary research and its contribution to the improvement of human knowledge. Moreover, future studies focused on the analysis of the engagement of newly formed research centers and networks in multi-center collaborative research may contribute to the understanding of the nature of the novel forms of scholarly cooperation.

A further implication of this study concerns the observed shift in national publication trends, which points to the emergence of a genuinely international research culture in this field. While a substantial share of publications originates from established research-intensive nations such as the USA, the UK, France, and Germany, the findings reveal a meaningful increase in contributions from Turkey, China, and Malaysia, indicating that scholarly activity in this domain is expanding eastward. Future studies would benefit from examining the dynamics of international research collaborations—including how collaborative ties form and evolve over time, how shared findings are disseminated across academic communities, and what structural factors facilitate or impede equitable cross-national partnerships. Gaining insight into how collaborations affect research output and efficiency could contribute to the design of more inclusive and effective global research networks. The co-authorship network analysis further suggests that the degree of collaborative integration varies by region, with scholars from Asian institutions tending to form more tightly clustered networks compared to their European and North American counterparts. Mapping these networks at future time points and investigating the factors that drive inter-institutional co-authorship could yield actionable insights for policies aimed at strengthening global academic collaboration. The subject area analysis additionally suggests that environmental science and social sciences are likely to remain the dominant disciplinary homes of this research agenda. As fields that sit at the intersection of natural systems and human behavior, their continued growth reflects the recognition that addressing environmental problems requires both scientific knowledge and an understanding of the social and psychological factors that shape human responses to those problems. Future research might productively explore emerging sub-fields within these disciplines and examine the policy and practice implications of their findings. In addition, understanding how emerging research areas influence funding allocation and curriculum reform could prove valuable in helping academic institutions align their programs with evolving societal needs. Overall, the publication trends documented in this study provide a rich foundation for understanding developments in research output, collaboration, and scholarly influence in the field of environmental attitudes and awareness—findings that hold relevance not only for researchers but also for policymakers, funders, and other stakeholders committed to advancing evidence-based environmental action.

Author contributions: All authors sufficiently contributed to this study and agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Ethical statement: The authors stated that this study does not require ethics committee approval since it is based on articles already in the existing literature.

AI statement: During the preparation of this manuscript, the authors used AI-based tools solely for the purposes of language editing and grammar checking. All scientific content, data interpretation, and conclusions are entirely the work of the authors, taking full responsibility for the integrity and originality of this manuscript.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

- Aberšek, B. (2022). Science, human awareness and environmental attitudes. *Journal of Baltic Science Education*, 21(3), 348-350. <https://doi.org/10.33225/jbse/22.21.348>
- Adom, D. (2017). Promoting cultural traditions, social inclusion and local community participation in environmental development schemes. *Journal of Urban Culture Research*, 14, 80-103. <https://doi.org/10.58837/CHULA.JUCR.14.1.6>
- Alexander, N. (2019). Environmental cultures: Review of 'the new poetics of climate change' and 'climate crisis and the 21st-century British novel.' *Cultural Geographies*, 27(2), 325-326. <https://doi.org/10.1177/1474474019884934>
- Aruga, K. (2020). Is environmental awareness a good predictor of an individual's altruism level? *Sustainability*, 12(19), Article 7929. <https://doi.org/10.3390/su12197929>
- Ata, E. (2018). Evaluation of adult environmental awareness behaviours in terms of social learning theory according to perceptions of primary and secondary school students. *International Journal of Higher Education*, 7(6), 54-62. <https://doi.org/10.5430/ijhe.v7n6p54>
- Azhar, S. N. F. S., Akib, N. A. M., Sibly, S., & Mohd, S. (2022). Students' attitude and perception towards sustainability: The case of Universiti Sains Malaysia. *Sustainability*, 14(7), Article 3925. <https://doi.org/10.3390/su14073925>
- Bakar, A. A., Osman, M. M., & Hitam, M. (2020). Attitudes and pro-environmental behaviours: Determining factor of personality and lifestyle. *Planning Malaysia*, 18(11). <https://doi.org/10.21837/pm.v18i11.704>
- Chouhan, S., & Bhatnagar, B. (2017). A study on the attitude level of male and female teachers regarding environmental attitude. *Asian Journal of Environmental Science*, 12(1), 43-47. <https://doi.org/10.15740/has/ajes/12.1/43-47>
- Davino, C., Esposito Vinzi, V., Santacreu-Vasut, E., & Vranceanu, R. (2019). An attitude model of environmental action: Evidence from developing and developed countries. *Social Indicators Research*, 143, 811-838. <https://doi.org/10.1007/s11205-018-1983-3>
- Djuric, D. (2022). The impact of upbringing and the local community on the development of environmental awareness among college educated people in Bosnia and Herzegovina. *Environment, Development and Sustainability*, 25(6), 5393-5410. <https://doi.org/10.1007/s10668-022-02271-0>
- Drimili, E., Gareiou, Z., & Zervas, E. (2019). Analysis of the world scientific production on public's opinion on environmental issues. *Environmental Research and Technology*, 2(4), 171-182. <https://doi.org/10.35208/ert.582337>
- Firmanshah, M. I., Abdullah, N., & Fariduddin, M. N. (2023). The relationship of school students' environmental knowledge, attitude, behavior, and awareness toward the environment: A systematic review. *International Journal of Academic Research in Progressive Education and Development*, 12(1), 432-449. <https://doi.org/10.6007/ijarped/v12-i1/15707>
- Goulgouti, A., Plakitsi, A., & Stylos, G. (2019). Environmental literacy: Evaluating knowledge, affect, and behavior of pre-service teachers in Greece. *Interdisciplinary Journal of Environmental and Science Education*, 15(1), Article e02202. <https://doi.org/10.29333/ijese/6287>
- Hastürk, G., Urhanoglu, M., & Gökbulut, Y. (2023). Examination of the environmental awareness primary school students and their attitudes towards the environment. *European Journal of Education Studies*, 10(7), 337-365. <https://doi.org/10.46827/ejes.v10i7.4885>
- Herdiansyah, H., Sholihah, S. M., & Frimawaty, E. (2022). Environmental awareness based on community knowledge, attitude, and behavior of the environmental impact of plastic packaging use in urban areas. *IOP Conference Series. Earth and Environmental Science*, 1111, Article 012030. <https://doi.org/10.1088/1755-1315/1111/1/012030>
- Hong, Z., & Park, I. K. (2018). The effects of regional characteristics and policies on individual pro-environmental behavior in China. *Sustainability*, 10(10), Article 3586. <https://doi.org/10.3390/su10103586>

- Jančius, R., & Gavenauskas, A. (2022). The influence of values and social environment on parents' environmental attitudes: Lithuanian case study. *Sustainability*, 14(20), Article 13415. <https://doi.org/10.3390/su142013415>
- Karavin, N., Geçim, G. Y. D., & Memiş, A. (2023). An overview of environmental attitudes, awareness, sensitivity, and literacy of nursing students in Turkey. *International Journal of Science Letters*, 5(1), 345-352. <https://doi.org/10.38058/ijsl.1256919>
- Kloek, M. E., Buijs, A. E., Boersema, J. J., & Schouten, M. G. (2017). Cultural echoes in Dutch immigrants' and non-immigrants' understandings and values of nature. *Journal of Environmental Planning and Management*, 61(5-6), 818-840. <https://doi.org/10.1080/09640568.2017.1319803>
- Kountouris, Y. (2022). Awareness days and environmental attitudes: The case of the "earth hour." *Ecological Economics*, 195, Article 107367. <https://doi.org/10.1016/j.ecolecon.2022.107367>
- LeSage-Clements, T., Sobolev, D., & Patton, B. (2024). GenZs environmental attitudes and ecology behavior nexus: Urgent education message. *Interdisciplinary Journal of Environmental and Science Education*, 20(2), Article e2405. <https://doi.org/10.29333/ijese/14413>
- Mihanpour, H., Khashij, M., Shamsizadeh, Z., Gholami, M., Ebrahimi, A., Rezaeipandari, H., Malekhamadi, R., Arsham, A., Parizan, F., & Jafari, V. (2020). Assessment of environmental literacy: A case study of YAZD citizens' awareness, attitudes, and practices in 2017. *Journal of Community Health Research*, 9(3), 149-158. <https://doi.org/10.18502/jchr.v9i3.4272>
- Miklós, A. (2020). Environmental attitudes and ecological anthropocentrism: A new challenge in environmental higher education. *Journal of Education, Culture and Society*, 5(1), 28-40. <https://doi.org/10.15503/jecs20141.28.40>
- Milfont, T. L., & Schultz, P. W. (2016). Culture and the natural environment. *Current Opinion in Psychology*, 8, 194-199. <https://doi.org/10.1016/j.copsyc.2015.09.009>
- Miller, L. B., Rice, R. E., Gustafson, A., & Goldberg, M. H. (2022). Relationships among environmental attitudes, environmental efficacy, and Pro-Environmental behaviors across and within 11 countries. *Environment and Behavior*, 54(7-8), 1063-1096. <https://doi.org/10.1177/00139165221131002>
- Mónus, F. (2022). Environmental education policy of schools and socioeconomic background affect environmental attitudes and pro-environmental behavior of secondary school students. *Environmental Education Research*, 28(2), 169-196. <https://doi.org/10.1080/13504622.2021.2023106>
- Orbanić, N. D., & Kovač, N. (2021). Environmental awareness, attitudes, and behaviour of preservice preschool and primary school teachers. *Journal of Baltic Science Education*, 20(3), 373-388. <https://doi.org/10.33225/jbse/21.20.373>
- Perera, E. A. C. N., Mahaliyana, A. S., Keppetigoda, D., & De Alwis, L. W. R. (2024). Assessment of environmental attitudes and behavior of secondary school students in Sri Lanka. *Agricultural and Environmental Education*, 3(2), Article em007. <https://doi.org/10.29333/agrenvedu/15484>
- Qing, C., Guo, S., Deng, X., & Xu, D. (2021). Farmers' awareness of environmental protection and rural residential environment improvement: A case study of Sichuan Province, China. *Environment, Development and Sustainability*, 24(9), 11301-11319. <https://doi.org/10.1007/s10668-021-01909-9>
- Sachdeva, S. (2016). The influence of sacred beliefs in environmental risk perception and attitudes. *Environment and Behavior*, 49(5), 583-600. <https://doi.org/10.1177/0013916516649413>
- Sales, R. G., Sousa, A. A. R., Yáñez, E., Cano, L. B., Raffin, D., Jatar, L., Astrada, E., Rubio, M. C., Aguilera, P. A., Quintana, R. D., & Rescia, A. J. (2023). Degree of importance of demographic and socio-cultural factors in environmental perception: bases for the design of public policies in Argentina and Spain. *Environment, Development and Sustainability*, 26(4), 9005-9024. <https://doi.org/10.1007/s10668-023-03079-2>
- Schneider-Mayerson, M., Gustafson, A., Leiserowitz, A., Goldberg, M. H., Rosenthal, S. A., & Ballew, M. (2020). Environmental literature as persuasion: An experimental test of the effects of reading climate fiction. *Environmental Communication*, 17(1), 35-50. <https://doi.org/10.1080/17524032.2020.1814377>
- Sottile, E., Meloni, I., & Cherchi, E. (2017). Hybrid choice model to disentangle the effect of awareness from attitudes: Application test of soft measures in medium size city. *Case Studies on Transport Policy*, 5(2), 400-407. <https://doi.org/10.1016/j.cstp.2016.09.001>
- Telesiene, A., & Hadler, M. (2023). Dynamics and landscape of academic discourse on environmental attitudes and behaviors since the 1970s. *Frontiers in Sociology*, 8. <https://doi.org/10.3389/fsoc.2023.1136972>
- Urban, J., & Kaiser, F. G. (2022). Environmental attitudes in 28 European countries derived from atheoretically compiled opinions and self-reports of behavior. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.875419>

- Walczak, D., Dziawgo, L., Dziawgo, D., Buszko, M., Pawłowski, J., Żołądkiewicz-Kuzioła, A., & Krupa, D. (2021). Attitudes and behaviors regarding environmental protection in the financial decisions of individual consumers. *Energies*, 14(7), Article 1934. <https://doi.org/10.3390/en14071934>
- Waylen, K. A., Fischer, A., McGowan, P. J. K., & Milner-Gulland, E. J. (2012). Interactions between a collectivist culture and Buddhist teachings influence environmental concerns and behaviors in the Republic of Kalmykia, Russia. *Society & Natural Resources*, 25(11), 1118-1133. <https://doi.org/10.1080/08941920.2012.663065>

<https://www.ejmste.com>