

## **Bibliometric Analysis on the Environmental Ethics Performance. Future Trends**

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### **Abstract**

*Environmental ethics highlights the values and principles involved in combating environmental problems such as pollution, species and habitat loss, and climate change. The main objective of this study is to provide an overview of environmental ethics-related academic studies to highlight the main aspects and future research trends. This study is based on various studies from the national and international specialized literature. The methodology used consists of a quantitative research through a bibliometric analysis as well as the analysis of several indicators relevant to the study. The sample analyzed consists of 981 academic articles published between 1975-2023. The results indicate a clear direction toward the expansion of the research field, especially among researchers from the economic and ecological fields.*

**Key words:** Environmental ethics, bibliometric analysis, environmental changes, business environment, future trends

**JEL classification:** Q56, R11

### **1. Introduction**

In a world economic system where the annual death rate significantly increased due to epidemics, war, extreme poverty, and malnutrition, or where hundreds of species of animals and plants disappear annually because of habitat destruction, the following question is addressed: *Do we need environmental ethics?* The importance of this aspect derives from the need to protect biological diversity and develop the quality of life through rigorous legislation, fines and environmental monitoring, which would lead to changing the fundamental values of today's deeply material and depersonalized society. To see what the future trends are, our main goal was to carry out a bibliometric analysis of environmental ethics performance, trying to highlight future research directions and the main aspects that characterize the environment. Through our approach, a contribution is made to the identification of the general directions of study and impact on environmental ethics worldwide and a high degree of knowledge regarding the measures that are required related to environmental ethics.

The content of the article is structured following the proposed objective, making a brief presentation of the specialized literature in section 2, a presentation of the research methodology and data source in section 3, and the empirical results are presented in section 4. Finally, a discussion of the obtained results is presented in section 5, and conclusions, limitations of the study, and future research directions are presented in section 6.

## 2. Literature review

Analyzing the literature on environmental ethics, it can be found that bibliometric studies have been widely used to analyze changes in different research fields such as global environmental ethics trends, achieving environmentally and socially sustainable growth through sustainable ecosystems, such as smart cities, long-term adaptation, and adaptability practices of enterprises to environmental changes etc. Specialized literature includes scientific articles, journals, books, as well as other documents that address the topic of environmental ethics. This topic is proving to be of global importance, in a context where the focus is increasingly on the circular economy. Interest in the field was not always so intense, but over time it experienced growth, a certain evolution, especially in the third millennium.

### 2.1. Bibliometric analysis

Bibliometric analysis refers to the application of quantitative techniques (statistical analysis, citation, and co-citation analyses etc.) to bibliometric data. Although bibliometric methodologies are not new, the proliferation of this analysis is relatively recent due to the progress and availability of academic indexing databases such as Web of Science, Scopus and Dimensions, as well as bibliometric software such as VOSviewer, Gephi and Leximancer.

Bibliometrics provides a set of important methods and indicators for studying the structure and process of scientific communication. Bibliometric studies are based on scientific results being public to generate progress in scientific research. At the same time, bibliometric data can represent points of reference for concerns in the field of science and technology, since longitudinal studies of scientific interests contribute to the determination of both the research areas that are gaining momentum and those that are regressing. Even so, there is little literature that uses bibliometric analysis to understand the emerging topics of global environmental issues, as well as future trends in environmental ethics.

### 2.2. Environmental ethics

The concept called “environmental ethics” is an academic field established in the last decades and which has attracted the attention of both the philosophical community as well as the civil society. In order to increase economic activity and the standard of living, people consume resources. The human tendency to conserve or destroy the environment for personal or group needs depends on man's perspective on it, called environmental ethics. Environmental ethics emerged as a new discipline that attaches ethical values to the natural world, such as environmental protection, maintaining biological diversity, social responsibility, efficient use of natural resources and sustainable environmental development (Van de Veer and Pierce, 1994; Armstrong and Botzler, 1998).

Environmental ethics studies the ethical relationships between human beings and the natural environment, including all non-human life forms. Environmental ethics is the one that determines what people think about how nature works, what their role in the world should be, and how nature should be valued. Thus, two contrasting types of environmental ethics are identified: (1) *anthropocentrism*, regarding non-human life forms and natural ecosystems as long as they are valuable for human well-being, preferences, and interests, in other words only human beings and their interests are ethically considerable; (2) *ecocentrism*, that is, those perspectives that recognize the intrinsic value in all life forms and surrounding ecosystems, including their abiotic components, and that therefore nature cannot be reduced to that which promotes human well-being.

Environmental ethics is today considered a relevant and interesting field of academic research and this fact has led to the publication of numerous works, books, empirical research, and bibliometric studies that analyze the dynamics and trends in the generation and production of knowledge in the field of environmental ethics (González and Puente, 2010; Arboleda Medina and Páramo, 2014a; Abraham *et al.*, 2015a; Lopera-Perez *et al.*, 2021). In addition, bibliometric studies allow detailed knowledge of research models, by identifying the main countries that publish in this field, authors, institutions, collaboration networks, research clusters, keywords, etc. (Maz-Machado

*et. al.*, 2015; González-Alcaide *et al.*, 2018) and allow the review of specialized literature in the field of environmental ethics. In recent years, various bibliometric studies on environmental ethics have been carried out around the world (Abraham *et al.*, 2015b; Hallinger and Chatpinyakoo, 2019; Prosser Bravo and Romo-Medina, 2019). In conducting bibliometric analyses, some authors suggested increasing the range of journals from different fields of knowledge in searches, due to the transdisciplinary character of the environment (Arboleda Medina and Páramo, 2014b). To be able to identify the scientific interest in the field of environmental ethics and to be able to determine its evolution, the authors developed a bibliometric analysis of the works published in this field.

### 3. Research methodology

The main objective of this review is to investigate current research and emerging trends in business ethics and to identify future research directions. The stages were followed according to the Prisma 2020 protocol. The Web of Science (WoS) database was chosen. The keyword “environmental ethics” was used for the search and WoS generated 2,776 results in the first stage according to the Prisma protocol. In the second stage, an attempt was made to refine the results obtained by selecting and eliminating certain components using exclusion criteria. Following the selection, only articles (939), books (96), book chapters (136) and peer-reviewed articles and those from conferences (104) in English related to the following fields were included: environmental sciences (327), environmental studies (866), ethics (806) (Table no. 1). In this stage, after refinement, 1,275 articles resulted. In the third stage, 294 search results unrelated to environmental ethics were excluded for eligibility reasons. In the end, only 981 search results were included in the sample. To perform the bibliometric analysis, the obtained results were exported in txt and excel format files.

*Table no. 1. Description of the procedure and use of exclusion criteria*

Category	Criterion	No. of articles
Search for	Topic: "environmental ethics"	2,776
Period	1975-2023	-
Access	Open access	-
Subject domain	Environmental sciences (327), environmental studies (866), ethics (806)	1,501
Document Type	Article (939), proceeding paper (104), book chapters (136), book (96)	1,275
Manual refinement	Book reviews (114), editorial material (104), early acces (63), discussion (13)	294
Results after manual refinement		<b>981</b>

*Source:* Created by the authors

The study undertaken aims to answer several research questions, namely: (1) What is the trend of world research related to environmental ethics? (2) Who are the most prolific authors? (3) What are the most productive publications? (4) Which funding bodies are the most supportive and which fields are associated with this type of multidisciplinary research? (5) Which articles are the most influential, based on authors and number of citations?

### 4. Findings

#### 4.1. Environmental ethics performance analysis

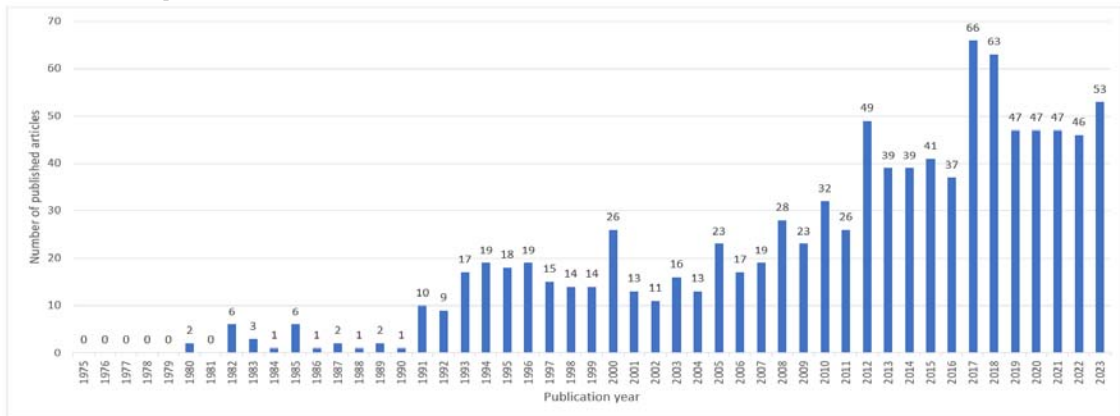
The environmental ethics performance analysis provides an overview of the development and distribution of environmental ethics by presenting the following bibliometric indicators from a statistical perspective:

#### 4.1.1. The evolution of the number of publications related to environmental ethics performance

The data set consists of 981 publications from 1975 to 2023, and the evolution of the number of publications over time is presented in Figure no. 1.

The academic interest in this field of research is an ascending one and this can be easily seen on the graph. This finding strongly supports the idea that this area of research related to the performance of environmental ethics is of constant importance to researchers, especially in the context of the various challenges faced by many countries to ensure the harmonization of economic and legal, environmental, and social aspects established as objectives in the conduct of business activities within companies and organizations.

Figure no. 1. The evolution of the number of publications related to the performance of environmental ethics in the period 1975-2023

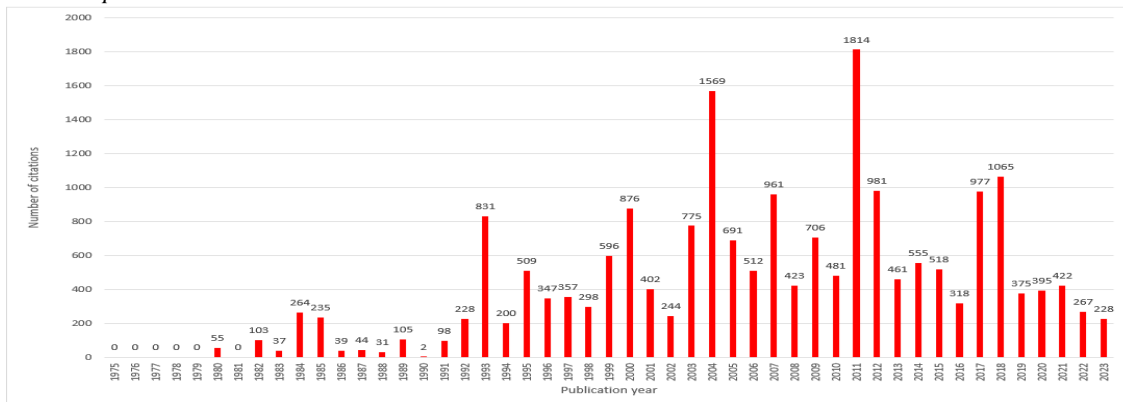


Source: Created by the authors

#### 4.1.2. The evolution of citation related to environmental ethics performance

The same constant trend is also observed in the evolution of the number of citations, presented in Figure no. 2. In addition, it can be noted that the highest number of citations per publication so far was recorded in 2011 (1814 citations). The highest number of citations per author (455) was recorded for the study by Kopnina (2012) who explored the implications of the shift from environmental education (EE) to education for sustainable development (ESD) in the context of environmental ethics. A significant number of citations were chronologically recorded as follows: Nelson (2009) (283 citations), Callicott (1985) (267 citations), McShane (2007) (234 citations) and Minter & Manning (2005) (198 citations).

Figure no. 2. The evolution of the number of citations related to the performance of environmental ethics in the period 1975-2023



Source: Created by the authors

#### 4.1.3. Contribution of institutions to the publication of articles related to environmental ethics performance

Table no. 2 presents the top 10 most active institutions that have contributed to this area of research related to the performance of environmental ethics. To get a comprehensive picture of these institutions and their relevance in this field, Table no. 2 presents significant information regarding the number of published articles, provenance (country of origin), total number of citations, and the average number of citations per article.

*Table no. 2. Contribution of institutions to the publication of articles related to environmental ethics performance and their location*

No.	Affiliation/Institution	Country	No. of articles	Total no. of citation	Medium no. of citations
1	Michigan State University	USA	13	242	18.61
2	University of Texas	USA	12	311	25.92
3	Radboud University Nijmegen	Netherlands	10	210	21.00
4	Oregon State University	USA	9	513	57.00
5	University of Tennessee	USA	9	249	27.67
6	Arizona State University	USA	9	228	25.34
7	Colorado State University	USA	9	159	17.67
8	University of Johannesburg	South Africa	9	113	12.56
9	Georgia Institute of Technology	USA	9	78	8.67
10	University of Wisconsin	USA	7	83	11.85

*Source:* Created by the authors

The surprises of this ranking are Radboud University Nijmegen in the Netherlands in 3rd place (10 articles and 210 citations) and the University of Johannesburg in South Africa in 8th place (9 articles and 113 citations). In our ranking, the American universities that research the field of environmental ethics are predominant in the number of 8. Other interesting and totally surprising aspects are also registered in the case of universities that have the same number of published articles (9), the citations vary significantly, the best cited being Oregon State University with 513 citations and an average of 57.00 citations/document.

#### 4.1.4. The most active source titles for publications related to environmental ethics performance

Table no. 3 lists 10 of the most productive sources in this field of research ranked by the number of articles. To provide a full picture of these journals and their relevance in this field, Table no. 3 presents information on the total number of citations, the average citations per article, and the impact factor recorded for each journal.

*Table no. 3. Contribution of the journals to the publication of articles related to the environmental ethics performance and their publisher*

No.	Journals	Publisher	No. of articles	Total no. of citations	Medium no. of citations
1	Environmental Ethics	Environmental Philosophy Inc.	198	2586	13.06
2	Environmental Values	White Horse Press	123	2362	19.20
3	Journal of Agricultural & Environmental Ethics	Springer	71	1268	17.86
4	Ethics Policy & Environment	Taylor & Francis Ltd.	32	216	6.75
5	Journal of Business Ethics	Springer	20	1379	68.95
6	Sustainability	MDPI Basel	19	206	10.84
7	Environmental Education Research	Taylor & Francis Ltd.	16	514	32.13

No.	Journals	Publisher	No. of articles	Total no. of citations	Medium no. of citations
8	Science & Engineering Ethics	Springer	15	170	11.34
9	African Environmental Ethics: A critical reader	Springer	15	40	2.67
10	Ecological Economics	Elsevier Science BV	14	682	48.71

*Source:* Created by the authors

We mention once again that the sorting of the data was done according to the number of articles (scientific production) and not according to the number of citations. Although the journals from Springer (4) are predominant, the first two positions of the list are occupied by the most cited journal (Environmental Ethics) with 2,586 citations in 198 articles and the second most cited journal (Environmental Values) which has 2,362 of citations from 123 articles.

#### 4.1.5. Countries that have contributed to the publications related to environmental ethics performance

Table no. 4 lists the top 10 most productive countries in this field of research ranked by the number of articles. To provide a comprehensive picture of the role and relevance of these countries in this field, Table no. 4 presents information on the total number of citations and the average number of citations per publication, and the percentage of contribution to scientific production. The most influential countries that have contributed to the development and global dissemination of publications in the field of environmental ethics performance are the USA (319 articles cited 5,572 times), whose percentage contributing to scientific production is 32.52% of the total number of articles published in this field, followed by UK (72 articles cited 1,670 times) and Canada (68 articles cited 1,663 times).

*Table no. 4. Contribution of countries to the publication of articles related to the performance of environmental ethics*

No.	Countries	No. of articles	Percentage (%)	Total no. of citations	Medium no. of citations
1	USA	319	32.52	5.572	17.47
2	UK	72	7.34	1.670	23.19
3	Canada	68	6.93	1.663	24.46
4	Australia	46	4.69	1.071	23.28
5	Netherlands	44	4.49	942	21.41
6	Germany	37	3.77	649	17.54
7	China	31	3.16	433	13.97
8	South Africa	23	2.34	335	41.56
9	France	19	1.94	272	14.32
10	Spain	17	1.73	324	19.06

*Source:* Created by the authors

#### 4.1.6. The most cited publications in the field of environmental ethics

According to Table no. 5, the 10 most cited articles in the field of environmental ethics belong to Berkes (2004) with 1,037 citations, Hashim *et al.* (2011) with 636 citations and Chang (2011) with 588 citations.

Table no. 5. Contribution to the publication of articles related to the performance of environmental ethics

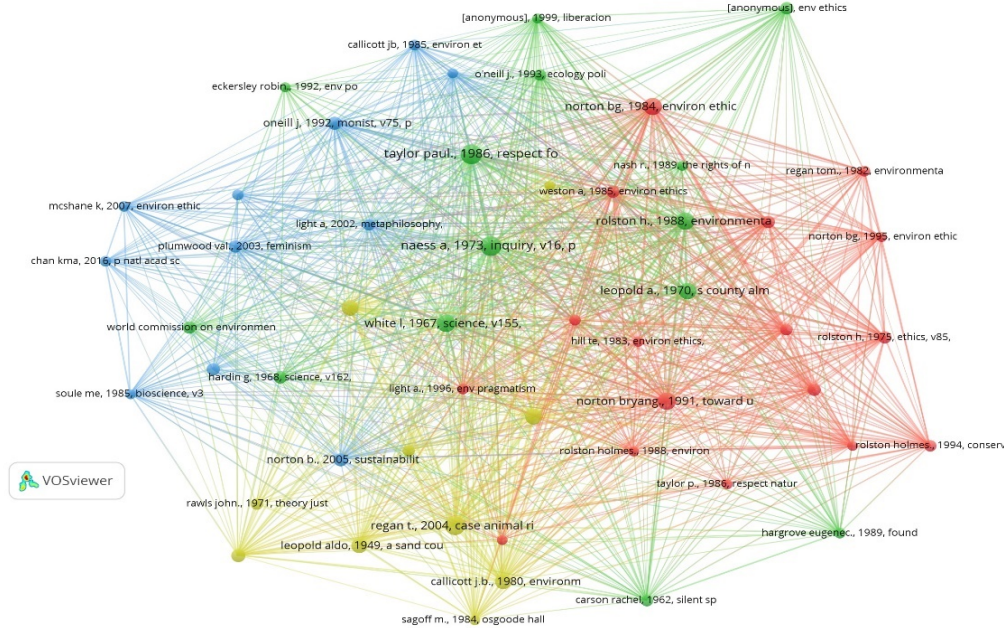
No.	Title of the article/publication/journal/volume/no./pages	Authors/year	Total no. of citations
1	<i>Rethinking Community-Based Conservation</i> , Conservation Biology, 18(3): 621-630.	Berkes (2004)	1037
2	<i>Remediation technologies for heavy metal contaminated groundwater</i> , Journal of Environmental Management, 92(10): 2355-2388.	Hashim <i>et al.</i> (2011)	636
3	<i>The Influence of Corporate Environmental Ethics on Competitive Advantage: The Mediation Role of Green Innovation</i> . J Bus Ethics 104, 361–370.	Chang (2011)	588
4	<i>Nonhuman Charisma</i> , Environment and Planning D-Society & Space, 25(5): 911-932.	Lorimer (2007)	436
5	<i>Natural fire regimes as spatial models for managing boreal forests</i> , Biological Conservation, 65(2): 115-120.	Hunter Jr. (1993)	346
6	<i>Relational values: the key to pluralistic valuation of ecosystem services</i> , Current Opinion in Environmental Sustainability, Volume 35, 1-7.	Himes and Muraca (2018)	228
7	<i>Education for sustainable development (ESD): the turn away from 'environment' in environmental education?</i> , Environmental Education Research, 18(5):699-717.	Kopnina (2012)	222
8	<i>Environmental Ethics and Weak Anthropocentrism</i> , Environmental Ethics, 6(2):131-148.	Norton (1984)	220
9	<i>Preferences, Information and Biodiversity Preservation</i> , Ecological Economics, 12(3):191-208.	Spash and Hanley (1995)	212
10	<i>Equity, environmental justice and sustainability: incomplete approaches in climate change politics</i> , Global Environmental Change-Human and Policy Dimensions, 13(3):195-206.	Ikeme (2003)	194

Source: Created by the authors

#### 4.1.7. Co-citation analysis

Co-citation analysis includes the evaluation of the references cited by the scientific publications included in the selected data set and the analysis of the relationships among the cited publications to better understand the development of the foundation of themes in a particular research field. In other words, as pointed out by Ferreira (2018), co-citation analysis allows the identification of publications that are co-cited by several other articles, which means that these cited publications are somewhat significant related to environmental ethics.

Figure no. 3. Co-citation network diagram of cited references



Source: Created by the authors using VOSviewer

For our sample of 981 articles, 39,022 cited references were identified and a minimum threshold of 20 citations of a cited reference was considered, which contained 52 cited references that met the threshold. To stimulate the understanding of the co-citation analysis of the articles, Figure no. 3 illustrates the network diagram, allowing visualization of the co-citation network of researchers in the field of environmental ethics performance. Table no. 6 shows the top ten references cited in our 981 articles with the highest link strength, citations, and link count in the field of environmental ethics.

According to Figure no. 3, there are four major clusters of cited references, where the largest cluster (green) has 17 cited references, the second cluster (blue) has 14 cited references, the third cluster (red) has 11 cited references, and the last cluster (yellow) has 10 cited references. It is interesting to note that among the first 10 cited references presented in Table no. 6, almost all references (except Regan T. (2004). *The Case for Animal Rights*, University of California Press and Goodpaster K.E. (1978). *On being morally considerable*, Journal of Philosophy 75 (6):308-325) are focused on environmental ethics (Figure no. 3).

Table no. 6. Top 10 cited references from the selected sample

No.	Publisher	No. of citations	Total link strength
1.	Taylor, P.W. (1986). <i>Respect for nature: A theory of environmental Ethics</i> , Princeton, New Jersey, Princeton University Press.	77	372
2.	Regan, T. (2004). <i>The Case for Animal Rights</i> , University of California Press.	76	362
3.	Norton, B.G. (1991). <i>Toward Unity among Environmentalists</i> , Oxford University Press.	60	353
4.	Callicott, J.B. (1989). <i>In Defense of the Land Ethic: Essays in Environmental Philosophy</i> , Suny Press.	53	351
5.	Rolston, H. III (1988). <i>Values in and Duties to the Natural World. Environmental Ethics</i> . Temple University Press.	59	348
6.	Norton, B.G. (1984). <i>Environmental ethics and weak anthropocentrism</i> , Environmental Ethics 6 (2):131-148.	63	343
7.	Naess, A. (1980). <i>Environmental ethics and spinoza's ethics. Comments on genevieve lloyd's article</i> , Inquiry - An Interdisciplinary Journal of Philosophy, 23(3), 313-325.	80	341
8.	Goodpaster, K.E. (1978). <i>On being morally considerable</i> , Journal of Philosophy 75 (6):308-325.	48	301



9.	White, L. Jr. (1967). <i>The Historical Roots of Our Ecologic Crisis</i> , Science, New Series, 155 (3767), 1203-1207.	64	260
10.	Callicott, J. B. (1985). <i>Intrinsic value, quantum theory, and environmental ethics</i> , Environmental Ethics, 7(3): 257-275.	46	238

Source: Created by the authors

## 5. Findings

Following the analysis carried out with the help of bibliometrics, we identified some of the future research topics of the specialists, these being the following:

- *Environmental values*: (1) the distinction between the intrinsic and extrinsic value of environmental ethics through the approaches of moral psychology and ethical theory (Callicott, 1985); (2) environmental philosophy by justifying dominant commitments to non-anthropocentrism, moral dualism, and wilderness/ wildlife conservation (McShane, 2007; Minter and Manning, 2008).

- *Environmental ethics*: (1) education in the field of environmental ethics (González and Puente, 2010; Koprina, 2012; Prosser Bravo and Romo-Medina (2019) and implications for environmental policy (Van de Veer and Pierce, 1994); (2) building an adequate theory of intrinsic value for non-human natural entities and for nature as a whole (Callicott, 1985).

## 6. Conclusions

By its approach, this study makes a significant contribution to the identification of general directions of study and impact on environmental ethics worldwide and a high degree of knowledge regarding environmental ethics measures. Thus, with the help of this study, the most important articles in the field of environmental ethics, the most cited and valuable authors, the most prestigious magazines, institutions, and countries that were involved in expanding the area of study and interest in environmental ethics were highlighted. In the group of authors, environmental ethics authors have proven to be very active in various fields, with many of their studies focusing on new technologies. Businesses face shocks from more and more directions, so the academic environment has transitioned the discourse into adaptation and resilience, a term increasingly used today, emphasizing collaborative learning and team cohesion, through contacts on social networks.

Of course, like any other study, this one also has certain limitations related to three aspects in particular: (1) the study period (1975-2023); (2) using only the Web of Science database to conduct the study, and (3) the small number of scientometric indicators used for measuring the data used through WoS. In this regard, we consider as future research directions: the extension of the measurement period, the use of other databases such as Scopus or Dimensions, and the use of a wider palette of indicators oriented to other unexplored levels of environmental ethics.

## 7. References

- Abraham, M.F., De Lorenzo, M.S. and Haramboure, 2015a. *Environmental psychology and sustainability. Bibliometric analysis of publications in open acces databases*. National University of Mar del Plata, Argentina.
- Abraham, J., Pane, M. and Chairiyani, R., 2015b. An Investigation on Cynicism and Environmental Self-Efficacy as Predictors of Pro-Environmental Behavior, *Psychology*, 6, 234-242. <https://doi.org/10.4236/psych.2015.63023>
- Arboleda Medina, I. F. and Páramo, P. 2014a. Research in environmental education in Latin America: A bibliometric analysis. *Colombian Education Magazine*, 66, 55–72.
- Arboleda Medina, I. F. and Páramo, P. 2014b. Research in Environmental Education: A Bibliometric Analysis. *Acta Colombiana de Psicología*, 66, 55–72. [https://doi.org/10.17227/01203916.66rce55\\_72](https://doi.org/10.17227/01203916.66rce55_72)
- Armstrong, S.J. and Botzler, R.G. 1998. *Environmental Ethics: Divergence and Convergence*, McGraw-Hill Humanities/Social Sciences/Languages.
- Berkes, F. 2004. Rethinking Community-Based Conservation, *Conservation Biology*, 18(3): 621-630. <https://doi.org/10.1111/j.1523-1739.2004.00077.x>
- Callicott, J. B. 1985. Intrinsic value, quantum theory, and environmental ethics, *Environmental Ethics*, 7(3): 257-275. <https://doi.org/10.5840/enviroethics19857334>

- Callicott, J.B. 1989. *In Defense of the Land Ethic: Essays in Environmental Philosophy*, Suny Press.
- Chang, Ch. 2011. The Influence of Corporate Environmental Ethics on Competitive Advantage: The Mediation Role of Green Innovation, *Journal of Business Ethics*, 104(3): 361-370. <https://doi.org/10.1007/s10551-011-0914-x>
- Ferreira, F. A. F. 2018. Mapping the field of arts-based management: Bibliographic coupling and co-citation analyses. *Journal of Business Research*, 85, 348–357. <https://doi.org/10.1016/j.jbusres.2017.03.026>
- Goodpaster, K.E. 1978. On being morally considerable, *Journal of Philosophy*, 75 (6):308-325. <https://doi.org/10.2307/2025709>
- González, E. J. & Puente, J. C. (2010). The field of environmental education in Latin American region. Features, challenges and risks. *Trajectories. Social Sciences Magazine*, 12 (31): 91–106.
- González-Alcaide, G., Salinas, A. and Ramos, J. M. 2018. Scientometrics analysis of research activity and collaboration patterns in Chagas cardiomyopathy. *PLOS Neglected Tropical Diseases*, 12(6), Article e0006602. <https://doi.org/10.1371/journal.pntd.0006602>
- Hallinger, P. & Chatpinyakoo, C. 2019. A bibliometric review of research on higher education for sustainable development, 1998–2018. *Sustainability*, 11(8), article 2401. <https://doi.org/10.3390/su11082401>
- Hashim, M.A., Mukhopadhyay, S., Sahu, J. N. and Sengupta, B. 2011. Remediation technologies for heavy metal contaminated groundwater, *Journal of Environmental Management*, 92(10): 2355-2388. <https://doi.org/10.1016/j.jenvman.2011.06.009>
- Himes, A. and Muraca, B. 2018. Relational values: the key to pluralistic valuation of ecosystem services, *Current Opinion in Environmental Sustainability*, Volume 35, 1-7. <https://doi.org/10.1016/j.cosust.2018.09.005>
- Hunter Jr., M.L. 1993. Natural fire regimes as spatial models for managing boreal forests, *Biological Conservation*, 65(2): 115-120. [https://doi.org/10.1016/0006-3207\(93\)90440-C](https://doi.org/10.1016/0006-3207(93)90440-C)
- Ikeme, J. 2003. Equity, environmental justice and sustainability: incomplete approaches in climate change politics, *Global Environmental Change-Human and Policy Dimensions*, 13(3):195-206. [https://doi.org/10.1016/S0959-3780\(03\)00047-5](https://doi.org/10.1016/S0959-3780(03)00047-5)
- Kopnina, H. 2012. Education for sustainable development (ESD): the turn away from 'environment' in environmental education?, *Environmental Education Research*, 18(5):699-717. <https://doi.org/10.1080/13504622.2012.658028>
- Lopera-Perez, M., Maz-Machado, A., Madrid, M.J. and Cuida, A. 2021. Bibliometric analysis of the international Scientific Production on Environmental Education, *Journal of Baltic Science Education*, 20(3): 428-442. <https://doi.org/10.33225/jbse/21.20.428>
- Lorimer, J. 2007. Nonhuman charisma, *Environment and Planning D-Society & Space*, 25(5): 911-932. <https://doi.org/10.1068/d71j>
- Maz-Machado, A., Muñoz-Ñungo, B., Gutiérrez-Rubio, D. and León-Mantero, C. 2015. Patterns of authorship and scientific collaboration in education: The production of Colombia in ESCI. *Library Philosophy and Practice*, article 4278.
- McShane, K. 2007. Anthropocentrism vs. Nonanthropo-centrism: why should we care?, *Environmental Values*, 16(2): 169–186. <https://doi.org/10.3197/096327107780474555>
- Minter, B.A. and Manning, R.E. 2005. An appraisal of the critique of anthropocentrism and three lesser known themes in Lynn White's The historical roots of our ecologic crisis, *Organization & Environment*, 18(2): 163-176. <https://doi.org/10.1177/1086026605276196>
- Naess, A. 1980. Environmental ethics and spinoza's ethics. Comments on genevieve lloyd's article, *Inquiry -An Interdisciplinary Journal of Philosophy*, 23(3), 313-325. <https://doi.org/10.1080/00201748008601911>
- Nelson, M.P. and Vucetich, J.A. 2009. On Advocacy by Environmental Scientists: What, Whether, Why, and How. *Conservation Biology*, 23(5): 1090-1101. <https://doi.org/10.1111/j.1523-1739.2009.01250.x>
- Norton, B.G. 1984. Environmental Ethics and Weak Anthropocentrism, *Environmental Ethics*, 6(2):131-148. <https://doi.org/10.5840/ENVIROETHICS19846233>
- Norton, B.G. 1991. *Toward Unity among Environmentalists*, Oxford University Press.
- Prosser Bravo, G. and Romo-Medina, I. 2019. Research in Environmental Education with Minors in Ibero-America: A bibliometric review from 1999 to 2019. *Mexican Journal of Educational Research*, 24(83): 1027–1053.
- Regan, T. 2004. *The Case for Animal Rights*, University of California Press.
- Rolston, H. III. 1988. *Values in and Duties to the Natural World. Environmental Ethics*. Temple University Press.

- Spash, C.L. and Hanley, N. 1995. Preferences, Information and Biodiversity Preservation, *Ecological Economics*, 12(3):191-208. [https://doi.org/10.1016/0921-8009\(94\)00056-2](https://doi.org/10.1016/0921-8009(94)00056-2)
- Taylor, P.W. 1986. *Respect for nature: A theory of environmental Ethics*, Princeton, New Jersey, Princeton University Press.
- Van de Veer, D. and Pierce, Ch. 1994. *The Environmental Ethics an Policy Book: Philosophy, Ecology, Economics*, Wadsworth Publishing.
- White, L. Jr. 1967. The Historical Roots of Our Ecologic Crisis, *Science, New Series*, 155 (3767): 1203-1207. <https://doi.org/10.1126/science.155.3767.1203>