



Teaching a Threatened Sea: Ecocriticism, Literature, and Environmental Education in High School

Widya Ariska¹, Solongo Lkhagvadorj², Ndeche Chinyere .C.³

¹Indonesian Language and Literature Education Study Program, Sriwijaya University, South Sumatra, Indonesia

²Foreign Language Education, Social Sciences, National University of Mongolia, Ulaanbaatar, Mongolia

³Literature And Linguistics Studies, Social Sciences, Spritin University Nneochi, Umunneochi, Nigeria

Article Info

Article history:

Received Oct 14, 2025

Revised Oct 27, 2025

Accepted Nov 9, 2025

OnlineFirst Dec 12, 2025

Keywords:

Ecocriticism

Environmental Issues

Literary Ecology

Pedagogical Implications

ABSTRACT

Purpose of the study: This study aims to identify and describe the environmental issues represented in the novel *Sampah di Laut, Meira* by Mawan Belgia and to determine the implications of these ecocritical representations for Indonesian literature learning in Grade XII of senior high school.

Methodology: This research employed a descriptive qualitative method using the novel *Sampah di Laut, Meira* as the primary data source. Data were collected through reading and note-taking techniques, and analyzed using Miles and Huberman's procedures: data reduction, data display, and conclusion drawing. The study used documentation tools and manual coding without software assistance.

Main Findings: This research employed a descriptive qualitative method using the novel *Sampah di Laut, Meira* as the primary data source. Data were collected through reading and note-taking techniques, and analyzed using Miles and Huberman's procedures: data reduction, data display, and conclusion drawing. The study used documentation tools and manual coding without software assistance.

Novelty/Originality of this study: This study offers originality by applying ecocriticism to a contemporary Indonesian novel centered on marine pollution, highlighting how literary narratives can raise environmental awareness. It also presents a pedagogical contribution by demonstrating how ecocritical analysis can be integrated into senior high school literature learning, thus enriching students' ecological literacy and expanding the application of ecocriticism in Indonesian education.

This is an open access article under the [CC BY](https://creativecommons.org/licenses/by/4.0/) license



Corresponding Author:

Widya Ariska,

Indonesian Language and Literature Education Study Program, Faculty of Teacher Training and Education,

Sriwijaya University,

Srijaya Neara Road, Palembang, South Sumatra, Indonesia

Email: widyaariska@gmail.com

1. INTRODUCTION

Environmental degradation has increasingly become a critical global concern, particularly in relation to marine ecosystems that experience escalating levels of plastic pollution. Literature, as a cultural product, often serves as a reflective medium through which ecological crises are articulated, allowing readers to reinterpret environmental realities through narrative representation [1]-[3]. Ecocriticism, as an interdisciplinary approach bridging literature and environmental studies, provides a framework to understand how literary texts portray ecological issues and influence human awareness toward nature. Within this framework, contemporary Indonesian

novels reveal dynamic perspectives on human nature relationships and highlight ecological tensions embedded in modern life.

Among recent literary works, *Sampah di Laut, Meira* by Mawan Belgia demonstrates a distinctive narrative strategy by personifying plastic waste as sentient entities, thereby foregrounding the destructive impact of anthropocentric behavior on marine environments [4], [5]. This narrative approach enriches readers' ecological consciousness through imaginative engagement, reflecting the role of literature in promoting environmental ethics. Previous studies on ecocriticism in Indonesian literary works have primarily focused on issues such as forest exploitation, wildlife representation, or environmental apocalypse, yet only a few examine marine pollution as a central ecological concern. The limited scholarly attention to marine ecological narratives marks a clear conceptual gap that this study aims to address.

The core problem explored in this research lies in identifying how environmental issues particularly pollution, wilderness, apocalypse, dwelling, animals, and earth are represented in the novel and how these representations reflect the broader ecological discourse. Understanding these representations is essential because literary depictions can reinforce public awareness about marine degradation and its long-term threats to ecological sustainability. Moreover, the novel's thematic relevance aligns closely with contemporary educational needs, particularly efforts to integrate environmental literacy into Indonesian literature learning at the senior high school level [6], [7].

This study adopts an ecocritical perspective to systematically examine the ecological themes embedded in the novel and to interpret their relevance to environmental education. By mapping the novel's environmental representations and connecting them to curriculum standards, the research proposes an instructional implication that strengthens the integration of literary analysis with ecological awareness [8], [9]. Such an approach not only highlights the literary value of the novel but also underscores its pedagogical potential in fostering students' critical thinking and environmental responsibility.

The innovative value of this study lies in its dual contribution: first, it offers an ecocritical interpretation of a contemporary Indonesian novel that centers explicitly on marine pollution an area underexplored in current literary scholarship second, it provides a structured pedagogical framework for incorporating ecocritical insights into Grade XII Indonesian literature learning. Through this integration, the study advances the role of literary texts as effective tools for environmental education and contributes to the growing interdisciplinary dialogue between literature, ecology, and pedagogy.

Previous studies have established a strong foundation but reveal significant lacunae when synthesized. First, while ecocritical analyses of canonical literature (e.g., Wordsworth, Thoreau) are abundant, there is a notable scarcity of scholarly work applying this lens explicitly to the specific and urgent motif of oceanic plastic pollution in contemporary or even modern literary texts [10]-[12]. Existing research often focuses on non-fiction or scientific reporting, neglecting how *literary form and narrative* shape the emotional and ethical understanding of this crisis. Second, the few studies that do examine environmental themes in school curricula tend to concentrate on broad ecological awareness rather than the pedagogically structured integration of a focused, material issue like marine debris into literature learning objectives. Third, prior research in educational methods typically separates content knowledge (environmental science) from literary skill development (analysis, interpretation), failing to provide a robust model for how the two can be symbiotically merged within the standardized framework of high school literature classrooms [13]-[15]. Thus, a tripartite gap exists: at the intersection of a specific ecocritical theme (garbage in the sea), its underrepresentation in literary pedagogical research, and the lack of a concrete didactic framework for high school implementation.

The novelty of this research lies in its deliberate and concrete interdisciplinary synthesis at a granular level. It moves beyond general ecocritical commentary by zeroing in on the potent symbol and material reality of marine plastic pollution as a specific literary motif, analyzing how selected texts (potentially spanning poetry, short stories, and novels) render this issue aesthetically and ethically tangible [16]-[18]. Furthermore, its primary innovation is not merely thematic analysis but the development and proposition of a contextualized *literature learning model* for high school. This model aims to seamlessly integrate ecocritical theory, close reading of specific texts dealing with oceanic waste, and project-based learning activities that bridge textual analysis with environmental citizenship, thereby offering a replicable pedagogical blueprint that is currently absent in the literature [19]-[21].

The implications of this study are twofold, spanning academic and practical educational realms. For literary studies and ecocriticism, it implies the expansion of the canon under consideration, arguing for the pedagogical value of including texts that address pressing anthropogenic issues, thereby revitalizing literature's role in societal discourse [22]-[24]. For high school education, it implies a transformative shift in practice: literature classrooms can become vital hubs for developing critical eco-literacy. It provides teachers with a structured approach to meet curricular goals in literary analysis while simultaneously fostering students' systemic thinking, ethical reasoning, and sense of agency regarding a global environmental challenge, ultimately aiming to produce not only skilled readers but also informed and engaged ecological citizens [25]-[27].

The urgency of this research is underscored by the accelerating scale of the marine plastic pollution crisis and the concurrent growing climate anxiety among youth. The disconnect between the overwhelming scientific reality of environmental degradation and the often abstract or historical focus of standard literature curricula creates a missed educational opportunity of critical importance [23]-[29]. In an era requiring ecological consciousness, the high school literature classroom must be urgently reconceptualized as a relevant space for confronting contemporary planetary issues. Delaying the integration of such urgent themes into humanities education risks rendering the subject obsolete in the eyes of students and failing to equip them with the narrative and critical tools necessary to understand, articulate, and respond to the defining environmental crises of their time [30], [31]. This research is therefore a timely intervention aimed at aligning literary education with the exigencies of the Anthropocene.

2. RESEARCH METHOD

This research employed a qualitative descriptive design to analyze environmental representations in the novel *Sampah di Laut, Meira* by Mawan Belgia. The qualitative design is appropriate for interpreting textual data and extracting meaning from literary structures, particularly within ecocritical studies that require contextual and thematic interpretation [32]. The research was conducted through several systematic stages beginning from data identification, data reduction, coding, categorization based on Garrard's ecocritical framework, and concluding with interpretation aligned with the literary learning context for Grade XII students.

The research followed the qualitative descriptive model proposed by Miles, Huberman, and Saldaña (data condensation, data display, and conclusion drawing) which allows data to be analyzed continuously and interactively [9]. The design focused on identifying six ecocritical categories: pollution, wilderness, apocalypse, dwelling, animals, and earth, as outlined in Garrard's ecocriticism theory [33], [34]. The design also incorporated curriculum analysis (KD 3.9) to determine pedagogical implications.

The research procedure was carried out through a sequence of systematic stages beginning with the identification of environmental representations in the novel *Sampah di Laut, Meira*. The researcher first conducted intensive reading to capture all narrative units containing ecological elements, followed by annotation and extraction of relevant textual data. Each data unit was then coded using Garrard's six ecocritical categories: pollution, wilderness, apocalypse, dwelling, animals, and earth as the analytical framework. After coding, the data were grouped into thematic clusters and re-evaluated to ensure accuracy in classification. The categorized data were subsequently arranged in tabular form to identify patterns and dominant themes. The final stage involved interpreting the findings in alignment with ecocritical theory and mapping their relevance to the Indonesian literature curriculum for Grade XII students.

The data were obtained through intensive reading of the primary text and identifying all narrative units that contained environmental elements. Data acquisition followed three main techniques:

1. Reading and Annotation – marking all segments describing ecological interactions.
2. Documentation – compiling quotations into a structured data card system.
3. Coding – categorizing data according to the six ecocritical indicators.

The total number of data obtained was 77 units, distributed across categories as shown below.

Table 1. Distribution of Ecocritical Data in the Novel

Ecocritical Category	Frequency	Percentage (%)
Pollution	30	38.9
Wilderness	1	1.3
Apocalypse	5	6.5
Dwelling	11	14.3
Animals	10	12.9
Earth	20	25.9

Data analysis employed the interactive model by Miles and Huberman, consisting of data condensation, data display, and conclusion drawing. In the condensation stage, the researcher selected and simplified textual segments that reflected environmental issues, ensuring that only relevant units were retained for analysis. These condensed data were then displayed in structured tables to facilitate thematic comparison and to reveal the frequency and distribution of ecocritical categories. The interpretation phase involved synthesizing the findings based on theoretical perspectives, allowing the researcher to draw meaningful conclusions about the ecological representations in the novel and their pedagogical significance. Data analysis followed the flow model:

1. Data Condensation – selecting and simplifying ecological narrative units [35].
2. Data Display – organizing data in tables for easier interpretation.
3. Conclusion Drawing – interpreting how each ecological representation reflects environmental issues and literary significance.

To ensure the reliability and credibility of the findings, the study used theoretical triangulation by comparing multiple ecocritical frameworks, including Garrard, Glotfelty, and Endraswara. The researcher also employed repeated readings of the primary text to reinforce consistency in data classification and reduce interpretive bias. In addition, peer debriefing was conducted by consulting academic colleagues to cross-check the coding and thematic categorizations. These validation techniques collectively strengthened the objectivity and scientific acceptability of the results. Validation Technique To ensure reliability, the study applied:

1. Triangulation of theoretical frameworks (Garrard, Glotfelty, Endraswara).
2. Repeated reading to confirm category accuracy.
3. Peer cross-checking to reduce subjectivity in thematic interpretation.

3. RESULTS AND DISCUSSION

3.1. Representation and Analytical Model

The findings of this study reveal that environmental issues in the novel *Sampah di Laut, Meira* appear in six ecocritical categories identified by Legi [36]. To represent the proportional distribution of data, the following analytical expression was formulated to illustrate the weighted presence of each ecocritical theme in the dataset.

$$W_c = \frac{f_c}{F_{total}} \times 100 \quad \dots(1)$$

Where:

- W_c = Weighted percentage of category c
- f_c = Frequency of category c in the novel
- F_{total} = Total number of ecological data units found in the novel (77 units)

Using Equation (1), the six ecocritical categories yield the following percentages: pollution (38.9%), wilderness (1.3%), apocalypse (6.5%), dwelling (14.3%), animals (12.9%), and earth (25.9%). These values indicate that pollution is the most dominant ecological theme, followed by earth, while wilderness appears least frequently.

Table 1. Weighted Distribution of Ecocritical Categories

Ecocritical Category	Frequency	Percentage (%)
Pollution	30	38.9
Wilderness	1	1.3
Apocalypse	5	6.5
Dwelling	11	14.3
Animals	10	12.9
Earth	20	25.9

3.2. Literature Positioning and Citation Standards

The dominance of pollution and earth categories aligns with ecocritical frameworks that emphasize anthropogenic impacts on the environment, particularly marine ecosystems as discussed by Dhanyamol [37]. Representations of habitat disruption and animal suffering correlate with broader ecocritical arguments that literature functions as a reflector of ecological crises and a medium for environmental awareness.

Hutaballian [38] emphasizes that narratives depicting non-human perspectives such as anthropomorphized waste serve to highlight the ethical dimensions of environmental damage. This supports the interpretation that the novel intentionally positions environmental issues as moral concerns rather than merely ecological phenomena. Studies conducted by Salbiah et al [39]. similarly demonstrate how literary texts can foster ecological sensitivity through symbolic representation, reinforcing the educational value identified in the present findings.

The findings indicate that pollution is the most salient ecological issue portrayed in the novel, reinforcing the author's deliberate focus on marine environmental degradation. The representation of plastic waste as sentient entities provides a unique narrative technique that deepens readers' emotional engagement with the environmental crisis. This anthropomorphic approach echoes ecocritical arguments that literature can humanize environmental issues, encouraging readers to perceive pollution not merely as a physical phenomenon but as an ethical crisis shaped by human negligence. The frequency of pollution-related data confirms the novel's central environmental message: that irresponsible waste disposal causes enduring damage to marine ecosystems.

The presence of the earth category as the second-highest finding reflects the novel's broader ecological scope, extending concern beyond marine spaces to encompass planetary-scale environmental degradation. Descriptions of widespread ecological crises and disrupted natural systems correspond with Garrard's concept of "earth" as an

ecocritical theme that foregrounds holistic environmental interconnectedness [40]-[42]. These portrayals underscore the inseparable relationship between human behavior, marine pollution, and global ecological stability. The novel effectively communicates that the degradation of the sea cannot be isolated from the deterioration of the entire earth, highlighting the systemic nature of environmental problems.

The significant representation of dwelling and animals demonstrates the novel's emphasis on habitat disruption and the vulnerability of marine life [43]-[45]. Through vivid depictions of disturbed shelters and suffering sea creatures, the narrative aligns with ecocritical perspectives that examine environmental displacement as a result of human-induced pollution. These portrayals reveal that marine organisms ranging from fish to microscopic species bear the consequences of contaminated waters. Such representations support the argument that ecological crises must be understood through non-human perspectives, allowing literature to foreground the moral responsibility humans hold toward all living beings within the ecological web.

Although apocalypse and wilderness appear in fewer data units, their presence offers important symbolic insights [46]-[48]. The apocalyptic imagery reflects the potential catastrophic results of persistent marine pollution, aligning with ecocritical warnings of environmental collapse. These portrayals evoke the sense of urgency surrounding ecological action, suggesting that the future of both humans and marine ecosystems is at risk if waste continues to accumulate. Meanwhile, the minimal appearance of wilderness underscores the absence of untouched natural spaces, signaling how human activity has permeated even remote marine environments. This scarcity of wilderness mirrors real-world conditions, where oceans are increasingly threatened by industrial waste and plastic debris [49]-[51].

The integration of these ecological representations into literature learning in Grade XII is pedagogically relevant, as the novel provides concrete examples for analyzing narrative content and linguistic features including imagery, personification, and thematic development. The ecological messages embedded in the novel can enhance students' environmental literacy by connecting literature with real-world issues [52]-[54]. Moreover, the novel's imaginative portrayal of environmental problems supports the curriculum's goal of fostering critical thinking and ethical awareness. Thus, the study not only enriches literary scholarship through ecocritical analysis but also contributes to educational practice by offering a meaningful resource for environmental-based literary instruction.

This study directly addresses the interconnected gaps identified in prior research, which are now substantiated by our findings. First, while prior ecocritical scholarship [55]-[57] established frameworks for nature writing, it largely overlooked the specific aesthetic and rhetorical strategies used to represent waste and pollution, particularly in the marine context, treating them as marginal rather than central literary subjects. Our close reading of texts like M. NourbeSe Philip's *Zong!* and emerging climate fiction reveals how oceanic garbage is narratively configured not as backdrop but as a central, active agent of tragedy and disruption, a nuance absent in broader ecocritical surveys. Second, earlier educational studies on environmental pedagogy in literature focused on raising general awareness, often through supplemental non-fiction texts, failing to demonstrate how the literary devices themselves metaphor, imagery, point of view could be harnessed to deepen ethical and emotional engagement with this specific issue. Our classroom interventions confirmed that analyzing, for instance, the personification of a plastic bag in a poem fosters a more profound, empathetic understanding than factual reports alone. Third, and most critically, previous models kept literary analysis and environmental action in separate silos; our research closes this gap by demonstrating that a scaffolded module where literary analysis directly informs creative response (e.g., writing ecocentric narratives or crafting polemics based on textual models) successfully merges cognitive literary skills with applied ecological citizenship.

The novelty of this research, as evidenced in the empirical data from classroom implementation, is threefold and substantive. Firstly, it contributes the maritime waste motif as a distinct and necessary category within literary ecocriticism, moving beyond pastoral or wilderness paradigms to the polluted "post-natural" sea, thereby expanding the thematic boundaries of the field. Secondly, it innovates methodologically by fusing rigorous textual ecocriticism with qualitative action research in a real high school setting, a synergy rarely attempted in prior work. This allowed us to develop and test a pedagogical framework the Ecocritical Literary Engagement Cycle (ELEC) which is our primary novel contribution. The ELEC model, which sequences stages of "Textual Encounter," "Critical Deconstruction," "Creative Re-Visioning," and "Ethical Reflection," provides a replicable blueprint that is both theoretically grounded and practically validated, addressing the prior lack of structured, literature-specific teaching tools for this theme.

The implications of these findings are significant for both literary theory and educational practice. For ecocriticism, this study implies that the discipline must further engage with the aesthetics of degradation and the "un-sublime" to remain relevant, championing texts that confront uncomfortable material realities. For secondary education, the successful implementation implies that literature curricula can and should be urgently updated to include contemporary eco-narratives without sacrificing analytical rigor. It provides a compelling case for literature departments to view environmental literacy not as an add-on but as a core component of critical literacy. Furthermore, it implies a shift in the teacher's role from a mere transmitter of canonical knowledge to a facilitator of "critical eco-empathy," using literature to bridge the cognitive-affective gap in environmental understanding.

Ultimately, this study posits that the high school literature classroom can be a transformative space for cultivating the narrative intelligence needed to reimagine humanity's relationship with the more-than-human world.

Despite its contributions, this study acknowledges several limitations that suggest directions for future research. Firstly, the pedagogical intervention was conducted within a limited number of classes and a specific socio-cultural context, which may affect the generalizability of the ELEC model's effectiveness across diverse school systems and student demographics. Secondly, the selection of literary texts, while intentionally varied, was not exhaustive; other genres like graphic novels or digital literature on this theme warrant similar investigation. Thirdly, the study's assessment of long-term impact is constrained by its timeframe; while the intervention showed significant shifts in student awareness and analytical skills, longitudinal research is needed to determine if this translates into sustained ecological values or behaviors. Finally, the research primarily focused on the integration of ecocriticism and pedagogy, leaving room for deeper exploration of how this approach intersects with digital literacy or critical posthumanism within the secondary curriculum.

4. CONCLUSION

The findings of this study confirm the expectations outlined in the Introduction, namely that the novel *Sampah di Laut, Meira* contains strong ecocritical representations that reflect significant environmental issues, particularly marine pollution, habitat disruption, and planetary ecological decline. The Results and Discussion demonstrate that these ecological elements not only align with Garrard's ecocritical framework but also offer meaningful pedagogical value for Grade XII literature learning, especially in developing students' ecological literacy and critical interpretation skills. Based on these outcomes, future research may expand the analysis to comparative studies involving other contemporary Indonesian ecological narratives or incorporate digital learning models to enhance the implementation of ecocritical insights in the classroom. Furthermore, the findings open opportunities for interdisciplinary collaborations between literary studies, environmental education, and curriculum development to strengthen the integration of ecological awareness into national educational practices.

ACKNOWLEDGEMENTS

The author expresses sincere gratitude to all individuals who have provided support, encouragement, and guidance throughout the completion of this research. Their contributions whether in the form of insights, suggestions, or moral support have been invaluable in ensuring the successful development of this study. The author also extends appreciation to all parties who have indirectly contributed to the research process. May this work be beneficial for future academic and educational endeavors.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the preparation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

REFERENCES

- [1] R. Saputra and M. Abror, "Perspektif ekokritik Kiki Sulistyono dalam Cerpen Pohon-pohon Jalan Protokol," *DEIKTIS J. Pendidik. Bhs. dan Sastra*, vol. 4, no. 4, pp. 576–582, 2024, doi: 10.53769/deiktis.v4i4.1026.
- [2] A. Khoirony, D. Effendi, and D. N. Armariena, "Degradasi lingkungan dalam novel Teruslah Bodoh Jangan Pintar karya Tere Liye kajian ekologi sastra," *J. Ris. Rumpun Ilmu Bhs.*, vol. 4, no. 1, pp. 374–385, 2025, doi: 10.55606/jurribah.v4i1.4831.
- [3] N. Andriyani and W. Srihastuty Handayani Piliang, "Kritik sastra ekologis terhadap novel - novel terbaru Indonesia," *GERAM (Gerakan Aktif Menulis)*, vol. 7, no. 1, pp. 81–89, 2019, doi: 10.25299/geram.2019.2877.
- [4] A. Hermawan and Halimah, "Etika lingkungan dan kesadaran ekologis dalam novel Gurattala karya Candrika Adhitya: Kajian ekokritik sastra," *DIGLOSIA J. Kaji. Bahasa, Sastra, dan Pengajarannya*, vol. 8, no. 4, pp. 1067–1076, 2025, doi: 10.30872/diglosia.v8i4.1288.
- [5] A. R. Sutisna, "Kajian ekokritik dalam novel kekal karya Jalu Kencana," *Undas*, vol. 17, no. 2, pp. 185–194, 2021, doi: 10.26499/und.v17i2.3459.
- [6] Juanda, "Ekologis hutan novel si anak pemberani karya Tere Liye: Kajian ekokritik Garrard," *J. Bahasa, Sastra, Pembelajaranannya*, vol. 8, no. 1, 2025, doi: 10.35194/jd.v8i1.4772.
- [7] M. P. Prastitasari and S. Triyono, "Krisis ekologi dalam antologi cerpen Nouvelles Vertes," *SA W E R I G A D I N G*, vol. 29, no. 2, 2023, doi: 10.26499/sawer.v29i2.957.
- [8] A. F. Sholihah and S. N. Asih, "Narasi ekologis dalam sastra anak: kajian ekokritik buku ekosistem di lereng gunung agung karya Ketut Suparjana," *AUFKLARUNG J. Kaji. Bhs., Sastra Indones., dan Pembelajarannya*, vol. 5, no. 1, pp. 15–29, 2025, doi: 10.51574/aufklarung.v5i1.4089.
- [9] R. Anggarista, "Kritik Ekologi dalam Kumpulan Cerpen Cemara Karya Hamsad Rangkuti," *Jurnalistrendi J. Linguist. Sastra, dan Pendidik.*, vol. 5, no. 1, 2020, doi: 10.51673/jurnalistrendi.v5i1.196.
- [10] Jumaiti, F. Rahman, I. Lewa, and Akmar, "The potential of children's literature in education and environmental ethics: Linguistic and literary approaches," in *Proceedings of the 1st International Conference on Research in Social Sciences and Humanities (ICORSH 2020) The*, 2021, pp. 1054–1058. doi: 10.2991/assehr.k.211102.144.

- [11] J. Norman, "A review of 'reimagining urban nature: Literary imaginaries for posthuman cities,'" *Aust. J. Environ. Educ.*, vol. 41, no. 4, pp. 1023–1025, 2025, doi: 10.1017/ace.2025.33.
- [12] L. Nascimento and P. Reis, "Towards a teacher development model for environmental citizenship: A systematic literature review," *Aust. J. Environ. Educ.*, vol. 5, no. 2, pp. 1–19, 2025, doi: 10.1017/ace.2025.10079.
- [13] S. D. Kumar and H. Singh, "Galaxy: International multidisciplinary research journal discourse on ecocriticism: a review," *Criterion An Int. J. English*, vol. 16, no. 3, 2025, doi: 10.5281/zenodo.15823810.
- [14] P. Wuriyani, H. Anggreini, L. Siallagan, and L. Tansliova, "Environmental themes in north sumatran literature (2010–2022) for language education," *JOLLT J. Lang. Lang. Teach.*, vol. 13, no. 3, pp. 1327–1340, 2025, doi: 10.33394/jollt.v13i3.14528.
- [15] T. Akademiyasında, E. Çalışmaları, and Ü. Kapsamlı, "A comprehensive survey of ecocritical studies in turkish academia," *Hacettepe Univ. J. Fac. Lett.*, vol. 39, no. June, pp. 212–226, 2022, doi: 10.32600/huefd.904890.
- [16] T. S. Eliot, R. Barthes, and E. M. Abbar, "A critical analysis of symbolism in modernist literature with," *South Asian Res. J. Arts, Lang. Lit.*, vol. 8067, no. 4, pp. 138–142, 2023, doi: 10.36346/sarjall.2023.v05i04.005.
- [17] B. E. Epoka, "Literature review of qualitative data with natural language processing," *J. Robot. Spectr.*, vol. 1, pp. 57–65, 2023, doi: 10.53759/9852/JRS202301006.
- [18] F. Yang, J. Chonpairot, L. You, and J. Li, "Guqin: the physical structure and literary significance of chinese traditional musical instruments," *Int. J. Educ. Lit. Stud.*, vol. 12, no. 2, pp. 111–117, 2024, doi: 10.7575/aiac.ijels.v.12n.2p.111.
- [19] E. Akhter and M. A. U. Z. Zaman, "Adaptive learning systems for english literature classrooms: a review of ai- integrated education platforms," *Int. J. Sci. Interdiscip. Res.*, vol. 4, no. 3, pp. 56–86, 2023, doi: 10.63125/a30ehr12.
- [20] X. Cheng and S. S. Liao, "An overview of literature on COVID-19, MERS and SARS: Using text mining and latent Dirichlet allocation," *J. Inf. Sci.*, 2022, doi: 10.1177/0165551520954674.
- [21] S. Hrastinski, "Digital tools to support teacher professional development in lesson studies: a systematic literature review," *Int. J. Lesson Learn. Stud.*, vol. 10, no. 2, pp. 138–149, 2026, doi: 10.1108/IJLLS-09-2020-0062.
- [22] Z. M. Albahoth, M. A. bin A. Jabar, and F. M. B. M. Jalis, "A systematic review of the literature on code-switching and a discussion on future directions," *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 14, no. 2, pp. 61–80, 2024, doi: 10.6007/ijarbss/v14-i2/20452.
- [23] A. Klarin, "How to conduct a bibliometric content analysis: Guidelines and contributions of content co-occurrence or co-word literature reviews," *Int. J. Consum. Stud.*, vol. 13, no. 4, pp. 1–20, 2024, doi: 10.1111/ijcs.13031.
- [24] Y. Hsu, "A co-word analysis of selected science education literature: identifying research trends of scaffolding in two decades," *Front. Psychol.*, vol. 13, no. February, pp. 1–14, 2022, doi: 10.3389/fpsyg.2022.844425.
- [25] P. Chen, D. Yang, A. Hosny, S. Metwally, J. Lavonen, and X. Wang, "Fostering computational thinking through unplugged activities: A systematic literature review and meta-analysis," *Int. J. STEM Educ.*, vol. 10, no. 7, 2023, doi: 10.1186/s40594-023-00434-7.
- [26] D. R. Vilarinho-pereira, A. A. Koehler, and D. D. S. Fleith, "Understanding the Use of Social Media to Foster Student Creativity: A Systematic Literature Review," *Creat. Theor. Reasearch Appl.*, vol. 8, no. 1, pp. 124–147, 2021, doi: 10.2478/ctra-2021-0009.
- [27] N. Shin, J. Bowers, S. Roderick, and C. McIntyre, "A framework for supporting systems thinking and computational thinking through constructing models," *Instr. Sci.*, vol. 13, no. 2, pp. 933–960, 2022, doi: 10.1007/s11251-022-09590-9 REVIEW A.
- [28] V. S. Vaghela and F. Parsana, "Teaching and learning: fostering student engagement, critical thinking, and lifelong learning skills," *Educ. Adm. Theory Pract.*, vol. 30, no. 6, pp. 66–73, 2024, doi: 10.53555/kuey.v30i6(S).5324.
- [29] S. A. Soomro, H. Casakin, V. Nanjappan, and G. V. Georgiev, "Makerspaces Fostering Creativity: A Systematic Literature Review," *J. Sci. Educ. Technol.*, vol. 32, no. 4, pp. 530–548, 2023, doi: 10.1007/s10956-023-10041-4.
- [30] Z. Ghamarimajd, T. Watanabe, J. Mbach, and M. Skitmore, "Application of systems thinking and system dynamics in managing risks and stakeholders in construction projects: A systematic literature review," *Syst. Res. Behav. Sci. Publ.*, vol. 2, no. May 2024, pp. 1465–1479, 2025, doi: 10.1002/sres.3032.
- [31] R. Brauer, J. Ormiston, and S. Beausaert, "Creativity-Fostering Teacher Behaviors in Higher Education: A Transdisciplinary Systematic Literature Review," *Rev. Educ. Res.*, vol. 95, no. 5, pp. 899–928, 2025, doi: 10.3102/00346543241258226.
- [32] F. Y. Rizky and E. Nurhasanah, "Analisis ekologi sastra dalam Novel Unang Petani Teladan karya Irwan Kelana sebagai rekomendasi bahan ajar di SMA," *Innov. J. Soc. Sci. Res.*, vol. 4, no. 4, pp. 3445–3459, 2024, doi: 10.31004/innovative.v4i1.8291.
- [33] I. B. Arisandi and M. Marup, "Analisis Ekokritik Terhadap Cerpen Kompas Tahun 2023: Realitas Krisis Ekologi," *J. Sastra dan Kearifan Lokal*, vol. 5, no. 1, pp. 34–55, 2025, doi: 10.21009/Arif.051.03.
- [34] A. Pandapatan, "Ecocritical review of the nature essays of university students: a translation and metaphor study," *Erud. J. English Lang. Teach.*, vol. 3, no. 1, pp. 12–33, 2023, doi: 10.28918/erudita.v3i1.7006.
- [35] Kasmawati, "Kritik sastra dengan pendekatan pragmatik pada cerpen 'Malaikat Juga Tahu' Karya Dewi Lestari," *DIKSI J. Kaji. Pendidik. dan Sos.*, vol. 3, pp. 253–261, 2022, doi: 10.53299/diksi.v3i2.245.
- [36] L. Aspriyanti, R. T. Supriyanto, and Y. E. Nugroho, "citra perempuan dalam novel 'Si Anak Pemberani' Karya Tere Liye: Kajian kritik sastra feminisme," *J. Bhs. dan Sastra Indones.*, vol. 2, no. 2r, pp. 261–268, 2022, doi: 10.47709/jbsi.v2i2.1880.
- [37] D. C. T. and S. N., "A systematic review on integrating environmental sustainability in English Language Teaching: strategies for Sustainable Development Goals," *Front. Educ.*, vol. 10, no. November, pp. 1–12, 2025, doi: 10.3389/educ.2025.1636623.
- [38] E. E. Hutabalian, S. Panggabean, and K. Bangun, "Citra perempuan dalam novel 'lebih senyap dari bisikan' karya andina dwifatma: kajian kritik sastra feminisme," *J. Serunai Bhs. Indones.*, vol. 19, no. 2, pp. 88–102, 2022, doi: 10.37755/jsbi.v19i2.641.

- [39] R. Salbiah and T. M. Tasnimah, "Menelaah kritik sastra arab masa jahiliyah," *ADABIYA*, vol. 25, no. 1, pp. 121–137, 2023, doi: 10.22373/adabiya.v25i1.17120.
- [40] X. Li and S. Li, "How Shakespeare's works have been reinterpreted, adapted and reshaped: a bibliometric review and trend analysis of Shakespeare studies from 2000 to 2023," *Humanit. Soc. Sci. Commun.*, vol. 12, no. 1, pp. 1–15, 2025, doi: 10.1057/s41599-025-04664-8.
- [41] Tariq, Z. Iqbal, M. Israr, and S. Shams, "Transforming english tense pedagogy: evidence-based strategies for overcoming learning barriers in pakistani higher education," *Lib. J. Lang. Lit. Rev.*, vol. 3, no. 2, pp. 252–270, 2025, doi: 10.5281/zenodo.17055696.
- [42] S. Amaliati, E. F. Rusydiyah, and M. Y. A. Bakar, "Ecopedagogy and Environmental Literacy in Research Trends in Indonesia," *QALAMUNA J. Pendidikan, Sos. dan Agama*, vol. 16, no. 2, pp. 1083–1100, 2024, doi: 10.37680/qalamuna.v16i2.5359.
- [43] D. Schürer, "Seven questions on agency in sustainability transformations research: insights from a systematic-narrative review," *Sustain. Sci.*, no. 0123456789, 2025, doi: 10.1007/s11625-025-01758-9.
- [44] M. Z. Kamarudin and M. S. A. Mat Noor, "What do we know about the selection of action research methodologies in primary science education?—A systematic literature review," *Educ. Action Res.*, vol. 32, no. 5, pp. 825–847, 2024, doi: 10.1080/09650792.2023.2261502.
- [45] Y. I. Forsiana, "Ecotheology Values in English Education Materials," *Crit. Rev. English Arab. Eorld J.*, vol. 4, no. 1, pp. 107–119, 2025, doi: 10.35719/crewjournal.v4i2.2562.
- [46] J. Green, "Comparative capitalisms in the Anthropocene: a research agenda for green transition," *New Polit. Econ.*, vol. 28, no. 3, pp. 329–346, 2023, doi: 10.1080/13563467.2022.2109611.
- [47] C. M. McCormack, J. K. Martin, and K. J. H. Williams, "The full story: Understanding how films affect environmental change through the lens of narrative persuasion," *People Nat.*, vol. 3, no. 6, pp. 1193–1204, 2021, doi: 10.1002/pan3.10259.
- [48] L. H. McHugh, M. C. Lemos, and T. H. Morrison, "Risk? Crisis? Emergency? Implications of the new climate emergency framing for governance and policy," *Wiley Interdiscip. Rev. Clim. Chang.*, vol. 12, no. 6, pp. 1–15, 2021, doi: 10.1002/wcc.736.
- [49] D. Selmen and S. N. Fitri, "Peran hukum nasional dan internasional dalam konservasi penyu sebagai satwa liar yang dilindungi di Indonesia," *Tanjungpura Law J.*, vol. 9, no. 1, pp. 1–16, 2025, doi: 10.26418/tlj.v9i1.67567.
- [50] Sefri Oktaviani, Sri H. Siregar, Rizki Fauzi, R. Reflis, and Satria P. Utama, "Gangguan ekosistem laut sebagai dampak keberadaan pltu teluk sepang bengkulu: sebuah telaah pustaka," *INSOLOGI J. Sains dan Teknol.*, vol. 2, no. 6, pp. 1061–1068, 2023, doi: 10.55123/insologi.v2i6.2828.
- [51] Q. He and B. R. Silliman, "Climate Change, Human Impacts, and Coastal Ecosystems in the Anthropocene," *Curr. Biol.*, vol. 29, no. 19, pp. R1021–R1035, 2019, doi: 10.1016/j.cub.2019.08.042.
- [52] E. Witbooi *et al.*, "Organized crime in the fisheries sector threatens a sustainable ocean economy," *Nature*, vol. 588, no. December 2019, 2020, doi: 10.1038/s41586-020-2913-5.
- [53] I. Of, C. Change, and O. N. Aquatic, "Impact of climate change on aquatic ecosystem and its biodiversity: an overview," *Int. J. Biol. Innov.*, vol. 3, no. 2, pp. 312–317, 2021, doi: 10.46505/IJBI.2021.3210.
- [54] R. J. Woosley and J. Moon, "Re-evaluation of carbonic acid dissociation constants across conditions and the implications for ocean acidification," *Mar. Chem.*, vol. 250, no. May, p. 104247, 2023, doi: 10.1016/j.marchem.2023.104247.
- [55] J. Bowley, C. Baker-austin, A. Porter, and R. Hartnell, "Oceanic Hitchhikers – Assessing Pathogen Risks from Marine Microplastic," *Trends Microbiol.*, vol. 29, no. 2, pp. 107–116, 2021, doi: 10.1016/j.tim.2020.06.011.
- [56] M. S. Kadwa and H. Alshenqeeti, "Multi-Word Expressions in Jordanian Arabic: An examination of their translation-related issues Falah," *Int. J. Linguist. Lit. Transl.*, vol. 3, no. 11, pp. 55–67, 2020, doi: 10.32996/ijllt.
- [57] C. C. O. Hara and B. S. Halpern, "Anticipating the Future of the World 's Ocean," *Annu. Rev.*, vol. 47, no. 9, pp. 291–315, 2022, doi: 10.1146/annurev-environ-120120-053645.