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Ecoliteracy: nonfiction children's literature and the ecological pact

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Abstract. What kinds of nonfiction stories can engage young readers to develop ecological awareness and foster environmental action? Through the lens of literature, readers explore complex environmental themes, fostering deeper understanding and ecological empathy. This study examines how new nonfiction children's literature fosters ecoliteracy through specific narrative and communicative strategies. Building on insights from the literature review, we defined three key dimensions that guided the thematic analysis of 14 selected texts (published 2004–2024) available to primary school children in Italy and Ireland. These dimensions include narrative strategies, representations of ecosystem complexity and participatory approaches positioning children as environmental agents. These texts employ strategies such as personal narratives, multimodal designs and action-oriented frameworks enabling readers to develop both cognitive understanding and emotional connection to environmental issues. This study reveals how nonfiction's unique affordances can promote critical thinking, ecological awareness, and positive environmental action, contributing to our understanding of how literature nurtures environmentally conscious young citizens.

Key words: ecoliteracy, ecology; children's nonfiction, eco-pedagogy, environmental education.

Introduction

The planetary ecological crisis, of which climate change is a key driver, is one of the most complex and urgent challenges of our time. Manifestations such as biodiversity loss, resource-driven conflict, and climate-induced migration are no longer just future projections, but present realities that are shaping the lives of both humans and non-humans. The term "Anthropocene", introduced by Crutzen and Stoermer (2000), designates this human-dominated epoch characterised by rapid urbanisation, intensive resource extraction, and large-scale habitat change. This challenges us to reconsider how we narrate the relationship between humanity and the planet, and to consider what imaginative and practical resources children will require to inhabit that relationship responsibly.

Children's literature is a critical domain for reimagining human–nature relations. Stories for young readers influence which possible futures feel achievable and which forms of agency seem plausible. While the ecological potential of fiction has been extensively examined (Dobrin & Kidd, 2004; Gaard, 2009), the potential of children's nonfiction, which can combine authentic case studies with visualisations of complex systems, has received comparatively

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little research attention (Aronson & Malilang, 2025; Goga et al., 2021; Rybak, 2023; von Merveldt, 2018). Despite the growing presence of eco-themed nonfiction for young readers, scholarly research has tended to focus predominantly on fiction, leaving the unique affordances of nonfiction texts comparatively underexplored (Rybak, 2023). Publishing trends indicate that contemporary children's nonfiction is shifting towards multimodal, narrative-rich formats that blend factual accuracy with emotional resonance (Mascia, 2023). Rather than portraying ecological complexity as an abstract concept, these books depict it as a lived reality situated in particular places, communities and species. By combining documentation with engaging storytelling, they inspire young readers to recognise their own potential as ecological citizens and encourage them to take informed action.

This article investigates how such texts can foster ecological literacy and inspire environmentally responsible behaviour in readers aged 6 -11. Through a qualitative analysis of a corpus of nonfiction titles, spanning interactive question-and-answer books, documentary graphic narratives, lyric-factual picture books, activist manifestos, community-action storybooks, biographies and transmedia reportage, we identify narrative strategies that can foster ecological awareness along three intersecting lenses: engagement, complexity and agency. In doing so, together, these dimensions indicate that contemporary children's nonfiction renders shared responsibility visible, traces supply and energy chains and models everyday climate citizenship. The pattern that emerges can be described as a cognitive–affective–pragmatic triad, where cognitive elements clarify ecological mechanisms, affective cues elicit empathy and curiosity, and pragmatic components show feasible responses. This triad offers a concise way of characterising how nonfiction texts weave knowledge, emotion and action across diverse formats.

Theoretical Framework

The United Nations' 2030 Agenda for Sustainable Development (United Nations, 2015) highlights the importance of environmental issues in modern global development policies. However, fostering ecological awareness requires more than simply disseminating scientific information. According to the World Social Science Report (ISSC & UNESCO, 2013), environmental challenges should be reconceptualised as social processes requiring interdisciplinary collaboration and the integration of social knowledge into environmental problem-solving strategies. As Hackmann and Moser (2013, p. 35) observe, in order for society to reverse global environmental trends and improve human well-being, "the social sciences must step forward more forcefully to inform understanding of these social-ecological systems. Social science can help explain how these systems unfold and interconnect across space, from the local to the global, and in time, from the past and present into the future. These insights will help unblock the inherent limitations of our current thinking and language about these systems, articulate new narratives that transcend the nature–society dichotomy, and identify opportunities for new and more effective solutions". Similarly, Sustainable Development (UNESCO, 2017) underscores that, beyond technical and scientific knowledge, fostering values and attitudes is essential for achieving sustainability. Contemporary scholarship frames ecoliteracy not solely as scientific knowledge but as an interplay of cognitive understanding, emotional connection, critical consciousness and action-oriented engagement (Desmarais, 2024; Najib et al., 2024). Within this interdisciplinary context, nonfiction literature for children effectively combines scientific accuracy and socio-cultural insights.

Defined broadly, children's nonfiction encompasses texts that explain, describe, and communicate knowledge about specific topics (Mascia, 2024). Addressing diverse themes such as environmental sustainability and ecology (Mascia, 2022; Todaro & Mascia, 2022), this

genre increasingly functions as a medium for critical engagement. Traditionally viewed as an expository genre dedicated to factual accuracy (Moss, 2003), children's nonfiction has diversified in format, narrative voice and artistic style, encouraging critical thinking and layered forms of understanding (Sanders, 2018; Mascia, 2023). Recent years have witnessed, in fact, a marked evolution in how children's nonfiction is theorized, moving beyond its expository origins towards a sophisticated, multimodal, and dialogic medium for cultivating ecoliteracy. Nonfiction picture books are increasingly recognized for their capacity to merge factual accuracy with narrative immersion and aesthetic engagement, offering children meaningful frameworks for interpreting ecological complexity and their own place within it (Goga et al., 2021; Sanders, 2018).

To examine how nonfiction literature for children contributes to developing ecological awareness and promoting environmental action, this study draws on three complementary theoretical perspectives: ecoliteracy, ecocriticism and eco-pedagogy. In the following sections, each perspective is presented individually, highlighting their foundational concepts, theoretical origins and applicability to nonfiction literature aimed at fostering children's environmental awareness.

Ecoliteracy as the foundation for environmental awareness

Among the first scholars to articulate the concept of ecoliteracy, David W. Orr (1992) offered a foundational vision of what it means to be ecologically literate, emphasizing a broad understanding of the relationships between people and natural systems, and the necessity of living sustainably. Building on Orr's seminal work, later scholarship has synthesized ecoliteracy as encompassing knowledge, skills, and dispositions that enable citizens to understand ecological systems and act accordingly (McBride et al., 2013). Recent work refines this into four intertwined abilities: grasping core ecological concepts, discerning human-environment interactions, thinking in systems and translating understanding into everyday practice (Desmarais, 2024).

Over time, ecoliteracy has also come to be recognised as a cultural and affective practice. Beyond curriculum theory, it is embedded in stories that shape children's ecological understanding by intertwining factual knowledge with values, emotions and ethical reflection. Nonfiction is particularly significant in this respect, as it conveys accurate information through engaging narratives, linking real places, people and species to readers' lived experiences, it fosters an ecocentric orientation that positions humans as part of, rather than separate from, complex ecosystems. Multimodal nonfiction, in which verbal text, images and paratextual features work together, heightens conceptual comprehension and sustains a sense of wonder, helping young readers to grasp the "complex interrelationships" of sustainability and to appreciate the entanglement of human and planetary health (Laliena & Tabernero Sala, 2023).

This relational and affective stance aligns with recent empirical work on children's engagement with nonfiction. Drawing on holistic interviews, Kuzmičová and Supa (2024) explore how informational texts evoke not only curiosity and interest but also a sense of immersion and embodied involvement. Their findings suggest that nonfiction can generate sensory and emotional resonance through verbal and visual cues, particularly when content is framed as personally or environmentally relevant.

The literature also broadens the discussion to encompass questions of accessibility, equity and diversity. There is a growing emphasis on the need for ecoliteracy to incorporate local and global perspectives, recognize diverse identities, and directly address systemic inequalities (Muela-Bermejo & Pérez-Martínez, 2024; van der Beek & Lehmann, 2022). This line of research reframes ecoliteracy within a relational and affective paradigm, bringing it into conversation with social-emotional learning (SEL). From this perspective, sustainability

is cultivated not only through cognitive frameworks but as a frame of mind, a way of seeing, feeling and participating in the world that fosters inquiry, attentiveness and care across disciplinary and experiential domains (Murray & Poto, 2024).

In parallel, multisensory and accessible approaches to environmental communication, such as *Ocean Literacy programmes* that integrate touch, smell and multilingual mediation, show how multimodal design can deepen engagement, scaffold systems thinking and broaden inclusion (Panieri et al., 2024). This multimodal approach aligns closely with the affordances of nonfiction literature, which is uniquely capable of linking complex ecological data with sensory, narrative and emotional dimensions.

Alongside these developments, ecoliteracy is increasingly situated within global and regenerative frameworks. The growing awareness of planetary interdependence requires an ecoliteracy that attends to both local specificity and global entanglements (van der Beek & Lehmann, 2022). In this view, the ecological self is a subject shaped by biocentric values, intercultural perspectives and transdisciplinary modes of knowing. Muela-Bermejo and Pérez-Martínez (2024) advocate for an ecoliteracy rooted in regenerative ethics, one that fosters emotional attunement and cognitive complexity in our engagements with the more-than-human world.

This theoretical reorientation is reflected in the emergence of a "literature of questions" and a "literature of actions", which position the child as a participant in meaning-making, rather than a passive recipient of facts (Rybak, 2023; Sanders, 2018). Such texts use hybrid formats, including personal narrative, visual storytelling, and interactive design, to scaffold systems thinking and promote agency. Place-based and critical eco-pedagogical approaches further stress the importance of situated knowledge and the value of connecting learning to lived experiences and local contexts (Firinci Orman, 2024; Häggström & Schmidt, 2020). Taken together, these developments position ecoliteracy not only as systems understanding but as an intercultural, regenerative project attentive to global interdependence and multiple identities (Muela-Bermejo & Pérez-Martínez, 2024). This framing prepares the pedagogical shift discussed below, where nonfiction's multimodal designs and action-oriented paratexts invite young readers to locate themselves within interconnected socio-ecological systems.

Ecocriticism and children's literature: analytical frameworks for environmental narratives

Since William Rueckert introduced the term *ecocriticism* in 1978, the field of ecocritical analysis has expanded in scope, especially from the 1990s onward. Cheryll Glotfelty (1996, pp. xviii - xix) framed it as "the study of the relationship between literature and the physical environment", similar to how feminist criticism examines texts from a gender perspective, or how Marxist criticism examines them from a class perspective. Ecocriticism is now a rich, multifaceted discipline that investigates the representation of nature in literary texts, analyses the roles of physical settings in narratives, and considers the ecological values and messages conveyed, as well as the evolving portrayal of nature. Today ecocriticism foregrounds social-justice dimensions, underscoring the entanglement of ecological and equity concerns (Gaard, 2009).

Ecocriticism provides frameworks for examining how environmental themes are constructed and communicated in children's literature; where ecocritical analysis reveals specific strategies for representing the natural world that differ from fictional approaches. Applied to children's literature, including picture books and nonfiction, ecocriticism asks "how do texts depict nature and human–nature relationships" or "what environmental stories are told through which narrative techniques and imagery?". This ecocritical approach enables

us to dissect environmental nonfiction's content and form, understanding how texts engage young readers with ecological ideas.

While early ecocriticism primarily focused on representations of the natural world in literary texts, contemporary ecocritical scholarship encompasses a rich plurality of analytical frameworks. Recent approaches, including material ecocriticism, ecofeminism, and postcolonial ecocriticism, explore how environmental narratives intersect with issues of agency, gender, and cultural identity (Iovino & Oppermann, 2014). In children's literature, such frameworks enable the examination of how nature is constructed through narrative techniques like anthropomorphism and focalization, as well as through the interplay of visual and verbal elements. Furthermore, an ecocritical perspective highlights the educational dimension by investigating how stories can foster ecological literacy and ethical engagement. Scholars note that these narratives encourage young readers to see themselves as active participants in environmental discourse (Gaard, 2009). Dellacasa and Saporito (2023) highlight how material ecocriticism establishes "a conceptual fluidity able to fruitfully deconstruct a number of problematic dualisms along the way (same/other, human/world, mind/body, tamed/wild)" (p. 362), an approach particularly relevant for analyzing children's literature that seeks to bridge the nature-culture divide. Their framework of 'cross-cultural articulations' provides a theoretical foundation for studies that draw on texts from different cultural and linguistic contexts, such as our analysis of nonfiction children's literature published in Italy and Ireland.

However, it is important to recognize the potential limitations of ecocritical approaches in this field. Some critics point to the risks of didacticism, anthropocentric bias, or reductive binaries that may oversimplify the complexity of environmental issues (Goga et al., 2021). Current research encourages greater attention to ambiguity, irony, and affective responses, acknowledging the diverse ways in which children engage with environmental narratives.

Eco-pedagogy and agency

Eco-pedagogy shifts the discussion from analysis to action, asking how environmental narratives nurture agency, critical consciousness and collective transformation. Rooted in Paulo Freire's critical pedagogy principles, eco-pedagogy extends these ideas to ecological contexts, emphasizing that environmental education should simultaneously be education for empowerment and social change (Misiaszek, 2023). Rather than top-down transmission of facts about climate change or statistics about biodiversity loss, eco-pedagogy favours interactive, experiential, problem-solving learning. A meta-analysis synthesising five decades of research with children and adolescents reports consistently positive effects of environmental education on knowledge ($g = 0.953$), attitudes ($g = 0.384$), intentions ($g = 0.256$), and behaviours ($g = 0.410$). These results indicate cognitive gains with smaller but meaningful motivational and behavioural effects (van de Wetering et al., 2022).

Sanson and Bellemo (2021) highlight the importance of responses grounded in hope, empowerment, and collective action to help young people manage eco-anxiety and despair; engagement and activism can foster optimism and resilience. Likewise, Dominguez Contreras and Krasny (2022) show that even very young children can contribute to nature stewardship through age-appropriate, community-embedded projects, challenging views of children as passive recipients and positioning them as capable environmental agents. In this light, nonfiction literature, by documenting real solutions, profiling young environmentalists, and providing concrete evidence of positive change, can play a valuable role in addressing eco-anxiety, offering stories and examples of agency.

Unlike traditional environmental education focused on isolated behaviour change, eco-pedagogy invites learners to imagine broader social transformations. Greg Misiaszek (2023)

describes "ecopedagogical literacy" as the ability to critically read complex socio-political dynamics underlying environmental issues. In children's nonfiction, this potential appears in texts that make explicit the links between climate change, economics, and policy; present cases of environmental injustice; or profile communities defending environmental rights. Notably, the "Greta Effect" has fundamentally altered children's environmental literature, shifting the presentation of activism from individual action to collective endeavor (Rybak, 2023). By presenting real-world examples of environmental action and practical strategies, nonfiction literature provides young readers with the information, vocabulary and language needed to see themselves as eco-citizens and to imagine taking part in environmental solutions based on actual models and examples (van der Beek & Lehmann, 2022).

Place-based approaches further anchor learning in lived contexts, which holds that children form stronger connections when engaging with issues close to home. A systematic review of place-based education maps two decades of scholarship and underscores mechanisms such as student agency, learner–place interaction, and sense-based experiential learning as drivers of both disciplinary and ecological literacy (Yemini et al., 2023).

Nonfiction can support place-based education by documenting specific locations, creating local ecosystem field guides, and sharing stories about communities that have addressed environmental challenges. Nonfiction supports these approaches by documenting specific locales, offering field-guide formats, and narrating community responses to environmental challenges. In this space, children's literature becomes a site where culture and nature, knowledge and emotion, individual responsibility and collective transformation intersect; nonfiction grounds imagination in reality, anchors hope in actual achievements, and builds agency on real-world models (Mascia, 2024).

Research in environmental education also clarifies how knowledge, affect and actions are intertwined in practice. A mixed-methods systematic review of 105 studies reports positive outcomes along a continuum from behavioural antecedents (knowledge, attitudes, skills) to observed actions and, in a subset of cases, changes in ecological indicators (Ardoin et al., 2020). Programmes documenting direct impacts share four recurrent design features: anchoring learning in locally salient issues; building partnerships with scientists, resource managers, and community organisations; embedding action-project components; and planning for intentional measurement and reporting (Ardoin et al., 2020). These findings problematise linear "knowledge-attitude-behaviour" assumptions and instead model behaviour as emerging from dynamic socio-ecological systems in which place-based experience, shared norms, skill-building, and opportunities for meaningful action are decisive.

Taken together, these three perspectives provide the conceptual foundation for our study. Ecoliteracy highlights the ecological knowledge and attitudes that young readers can develop, ecocriticism draws attention to the literary strategies through which these ideas are conveyed, and eco-pedagogy emphasizes the action-oriented potential of children's texts. These three frameworks jointly informed the analytical dimensions applied to our corpus and connect directly to the study's aim of examining how nonfiction children's literature fosters ecoliteracy.

Methodology

Aim of the study and research question

The research design consisted of a thematic analysis of a corpus of nonfiction children's texts. The three analytical dimensions applied in the analysis were derived from the theoretical framework developed in Part 2. Thus, the review of relevant literature is not presented as a separate methodological stage, but as the conceptual foundation for the textual

analysis. Building on the theoretical considerations outlined above, this study aims to investigate how contemporary nonfiction children's literature can effectively foster ecological awareness and stimulate active commitment to environmental protection. Specifically, this research addresses the following question: What kinds of nonfiction stories can engage young readers to develop ecological awareness and foster environmental action? We define "engagement" as the capacity of a text to capture attention, elicit emotional involvement, and inspire pro-environmental attitudes and behaviors. While fictional environmental narratives have dominated scholarly attention in children's literature criticism, environmental nonfiction texts remain significantly underexplored (Aronson & Malilang, 2025; Goga, Iversen et al., 2021; Rybak, 2023; Rybak, 2023; Sanders, 2018; von Merveldt, 2018). By addressing this gap, our study contributes to this emerging field with an analysis of recent nonfiction children's literature and its potential to foster ecoliteracy, with particular attention to narrative strategies.

Research design and analytical framework

To address our research question, we combined literature review (Snyder, 2019) with thematic analysis (Braun & Clarke, 2021) to examine how contemporary nonfiction children's books communicate environmental themes to young readers aged 6–11. Thematic analysis, widely adopted across disciplines, is suited to our study as it allows for detailed analysis of both textual and visual elements while maintaining the interpretative depth necessary for understanding how children's literature functions. Our research design comprised two main components:

1) Literature review: to identify theoretical frameworks and pedagogical approaches pertinent to nonfiction literature and environmental education. We searched academic databases including EBSCOHost, ProQuest, Google Scholar, Web of Science, and Scopus, using keywords such as "nonfiction" "nonfiction children's literature", "ecoliteracy"; "ecology", "environment", "children", prioritizing relevant theoretical and empirical studies. The study included research published in the last twenty years, with a particular focus placed on peer-reviewed articles.

2) Corpus selection: we employed systematic purposeful sampling to select 14 nonfiction children's books (ages 6-11) available in Italy and Ireland. Books were identified through: (a) major publishers' catalogs, (b) environmental book awards, and (c) recommendations from children's librarians. From 87 initially identified titles (32 in Italian and 55 in English), we applied the following criteria:

- Central environmental themes
- Nonfiction genre
- Publication period 2004-2024, with emphasis on post-2015 titles
- Age-appropriate for 6-11 years
- Currently available in libraries in both countries
- Format diversity (biographies, informational, illustrated nonfiction, hybrid)

Inter-rater agreement was achieved through independent review and discussion of discrepancies. The final corpus reflects typical contemporary publishing trends while maintaining geographic and thematic diversity (see Table 1 for complete list).

Table 1 Study corpus (selected by authors)

Author(s)	Year	Original Title	English Translation	Publisher
Cousteau, P., & Hopkinson, D.	2016	Follow the Moon Home: A Tale of One Idea, Twenty Kids, and a Hundred Turtles	–	Chronicle Books
Damm, A.	2019	Cosa Diventeremo? Riflessioni intorno alla natura.	What Will Become of Us? Reflecting on Nature	Orecchio Acerbo
Davies, N., & Sutton, E.	2017	Lots: The Diversity of Life on Earth	–	Walker Books
De Marchi, V., & Fulci, R.	2021	Ragazze per l'ambiente: Storie di scienziate e di ecologia	Girls for the Environment: Stories of Scientists and Ecology	Editoriale Scienza
Dorey, M.	2021	Kids Fight Climate Change	–	Walker Books
Drummond, A.	2011	Energy Island: How One Community Harnessed the Wind and Changed Their World	–	Farrar, Straus and Giroux
Jancovici, M., & Blain, C.	2024	World without end: The million-copy selling graphic novel about climate change (ebook ed.).	–	Penguin Books Ltd.
Kamkwamba, W., & Mealer, B.	2012	The Boy Who Harnessed the Wind (Picture Book Edition)	–	Dial Books for Young Readers
Lindstrom, C. (Illus. by Goade, M.)	2020	We Are Water Protectors	–	Roaring Books Press
Lord, M., & Blattman	2020	The Mess That We Made	–	Flashlight Press
Strauss, R. (Illus. by Thompson, M.)	2004	Tree of Life: The Incredible Biodiversity of Life on Earth	–	Kids Can Press
Taddia, F., & Palazzi, E. (Illus. Ferrari, A.)	2019	Perché la Terra ha la febbre? E tante altre domande sul clima	Why Does the Earth Have a Fever? And Many Other Questions About Climate	Editoriale Scienza
Thunberg, G.	2019	No One Is Too Small to Make a Difference	–	Alan Lane, Penguin Publishing Books
Vico, A. (Illus. Carratello, V.)	2022	La notte delle tartarughe. I videomaker selvaggi	The Night of the Turtles. Wild Videomakers	Emons Libri

Analytical procedures

Following Braun and Clarke's (2021) six-phase thematic analysis process, adapted for multimodal children's literature:

Phase 1 - Familiarization: multiple readings of each text, attending to both verbal and visual elements, noting initial impressions about how environmental concepts were communicated. Given the bilingual nature of our corpus, we adopted a collaborative analytical approach. Texts in Italian (n=4) were initially analyzed by the Italian-speaking researcher and subsequently discussed with the full research team using detailed notes and translated excerpts. Texts in English (n=10) were analyzed by both researchers independently. This language-based division was mitigated through regular discussion meetings where key themes and examples were shared.

Phase 2 - Generating initial codes: identification of narrative strategies, visual techniques, and pedagogical approaches across the corpus. Unlike traditional coding, we maintained attention to literary devices and aesthetic qualities.

Phase 3 - Searching for themes: collating codes into potential themes, guided by our three analytical dimensions derived from the literature review:

- *Narrative strategies and reader engagement: how storytelling techniques facilitate cognitive understanding and affective engagement with ecological concepts.*
- *Representing ecosystems complexity*: how texts represent the interconnections between living forms and environments.
- *Inspiring ecological action and social responsibility: how literature creates a sense of efficacy and encourages readers to become actively engaged with ecologic issues.*

These dimensions, informed by theoretical frameworks rooted in ecoliteracy, ecocriticism, and eco-pedagogy, provided analytical lenses for examining nonfiction literature's narrative and communicative strategies, enabling us to identify how texts inspire environmental care and empower young readers toward meaningful ecological action.

Phase 4 - Reviewing themes: checking themes against the corpus selected, ensuring they captured meaningful patterns in how texts foster ecological awareness while respecting each book's unique approach.

Phase 5 - Defining and naming themes: refining the specifics of each theme and the overall story they tell about nonfiction environmental literature for children.

Phase 6 - Producing the analysis: selection examples that illustrate each theme, relating findings back to our research question and theoretical frameworks.

This adaptation of thematic analysis respects the interpretative traditions of children's literature scholarship while providing methodological rigor. Rather than seeking inter-rater reliability or quantifiable results, we prioritized deep engagement with texts to understand how narrative and visual strategies work together to communicate environmental concepts and inspire ecological consciousness in young readers.

Results

The educational potential of nonfiction in promoting ecological awareness emerged through analysis of books aimed at young audiences in Italy and Ireland. The analysis revealed how contemporary nonfiction employs sophisticated strategies across the three main dimensions previously cited: narrative strategies that actively involve readers in knowledge construction, representations of ecosystem complexity and systemic ecological relationships, and capacity to inspire responsible behaviors and encourage social action supporting the environment.

Narrative strategies and reader engagement

Analysis of the corpus revealed three principal narrative strategies for engaging young readers with environmental content: (1) biographies and memoirs personalizing environmental issues, (2) multilayered narratives combining different formats to enrich the reading experience, and (3) interactive strategies such as question-and-answer formats actively involving young readers.

Biographies and memoirs: the power of personal narratives

Personal narratives emerged as particularly effective in making environmental issues accessible and emotionally resonant. *Girls for the Environment: Stories of Scientists and Ecology* [authors' translation of: *Ragazze per l'ambiente. Storie di scienziate e di ecologia*] by Vichi De Marchi and Roberta Fulci (2021), uses biographical storytelling to present ten female scientists who have contributed to environmental research. The book illustrates dedication, passion, and determination in tackling ecological challenges.

The Boy Who Harnessed the Wind (Kamkwamba, 2012) transforms environmental innovation from abstract possibility to lived reality. This memoir's children's version tells the true story of the author, a boy from Malawi who, through perseverance and ingenuity, builds a windmill to provide electricity for his community. The personal narrative structure allows readers to identify with the protagonist's journey, making sustainable technology tangible and achievable.

No One Is Too Small to Make a Difference (Thunberg, 2019) presents Greta's speeches in chronological order, accompanied by photographs of her journeys, narrating her experience of youth activism and leadership.

Multilayered narrative structures

The analysis revealed sophisticated uses of multilayered narratives that accommodate diverse reading levels and learning styles. *The Night of the Turtles. Wild Videomakers* [authors' translation from *La notte delle tartarughe. I videomaker selvaggi*] by Andrea Vico (2022) follows a group of young videographers as they document the nesting of sea turtles in a bay in southern Italy. The book adopts a multi-layered narrative structure, alternating character dialogue, email exchanges with scientists, veterinarians, and teachers, notebook annotations providing technical information, and hands-on advice for sea turtle conservation. In-depth sections with extended scientific detail allow access to information at different levels, addressing various reader preferences and backgrounds.

Interactive engagement strategies

The question-and-answer format emerged as another technique for fostering active engagement.

An example is *Why Does the Earth Have a Fever? and Many Other Questions About Climate* [authors' translation from *Perché la terra ha la febbre e tante altre domande sul clima*] by Federico Taddia and Elisa Palazzi (2019), adopts an interview format to explain climate change. Through structured questions and answers, the text introduces environmental science terminology and concepts while validating young readers' curiosity and modeling scientific inquiry processes.

Communicating ecosystems complexity

Analysis revealed two principal approaches for communicating ecosystem complexity: (4) representing biodiversity and interdependence through interconnected narratives and (5) visual storytelling combining text and imagery to enhance comprehension and emotional engagement.

Representing biodiversity, connections and interdependence

Among the books included in the representative sample, *Lots: The Diversity of Life on Earth* by Nicola Davies and Emily Sutton (2017) and *The Tree of Life: The Incredible Biodiversity of Life on Earth* by Rochelle Strauss and Margot Thompson (2004), present multiple examples of interdependence among animals, plants and their environments. *Lots* describes how organisms are linked by relationships of mutual dependence, using detailed illustrations to represent ecological webs. *The Tree of Life* employs the tree metaphor alongside diagrams and graphic organizers to show divisions between biological kingdoms and relationships among life forms.

Visual Storytelling

Visual elements proved to be critical in communicating ecological complexity. Across the selected corpus, illustrations, and visual metaphors are commonly used to represent ecological connections, food webs and the diversity of living forms. *The Mess That We Made* (Lord & Blattman, 2020) employs rhythmic, cumulative language paired with sequential illustrations depicting marine pollution, building intensity before transitioning to environmental action. *We Are Water Protectors* (Lindstrom, 2020) narrates a young girl confronting an oil pipeline threat (visualized as a "black snake"), combining narrative and illustration to highlight environmental challenges and protection efforts.

Inspiring ecological action and social responsibility

The corpus revealed two principal strategies for inspiring ecological action: (6) participatory narratives moving readers from observation to concrete action, and (7) philosophical and reflective approaches fostering critical inquiry and personal reflection.

Participatory narratives: from observation to action

Books increasingly position readers as potential actors in environmental solutions. *Follow the Moon Home: A Tale of One Idea, Twenty Kids, and a Hundred Sea Turtles* (Cousteau & Hopkinson, 2016) presents the story of Vivienne and her classmates developing a sea turtle conservation project. The narrative follows the process step-by-step, showing how ideas turn into action through collaboration and community engagement.

The "we are what we do" series and *Kids Fight Climate Change* (Dorey, 2021) directly involve children by offering practical suggestions, missions and visual aids. *Energy Island: How One Community Harnessed the Wind and Changed the World* (Drummond, 2011) tells how Samsø transformed itself through renewable energy, emphasizing collective action and community agency in ecological change.

Philosophical and reflective approaches

What Will We Become? Reflecting on Nature [authors' translation from Was wird aus uns? Nachdenken über die Natur] by Antje Damm (2019) employs an interrogative format with minimalist illustration, inviting children to reflect on their relationship with nature without prescriptive solutions.

World Without End (Jancovici & Blain, 2024) combines narrative and visual elements in a graphic novel that presents climate change challenges and envisions collective solutions for a sustainable future.

Discussion

The findings of this research resonate with an international body of work highlighting contemporary children's nonfiction as a powerful catalyst for ecoliteracy. The genre's capacity to intertwine cognitive, affective, and practical dimensions enables children to become active

constructors of knowledge and responsibility. Reading, especially when supported by enabling mediation, emerges not as a passive act but as a relational and participatory process in which young readers critically interrogate texts, negotiate meanings, and envision possible actions (Graff & Shimek, 2020; Pérez-Martínez & Muela-Bermejo, 2024).

Narrative strategies and reader engagement

Modern nonfiction adopts hybrid approaches that blend factual precision with narrative and lyrical styles, resonating with the New Nature Study's emphasis on aesthetic, relational, and participatory engagement with the natural world, as described by op de Beeck (2018). One important outcome of this narrative turn is the positioning of young readers as active participants in the meaning-making process, aligning with the idea that children's nonfiction should be a "literature of questions" (Sanders, 2018), prompting inquiry and critical thinking instead of presenting authoritative answers. As Sanders (2024) argues, children's nonfiction biography, when grounded in original research and affectively rich storytelling, creates opportunities for critical engagement and emotional resonance that can deeply influence how young readers relate to complex social issues, including environmental ones. Biographies, memoirs and first-person narratives (e.g., *Girls for the Environment*; *The Boy Who Harnessed the Wind*) humanize environmental issues and provide relatable role models. By featuring real people and narrating their experiences, these books encourage readers to connect emotionally with the content and to internalize the values of perseverance, curiosity, and care for the Earth, thereby fostering a sense of agency in young readers. The analyzed books' trend toward multilayered and interactive structures transforms reading into dialogic, exploratory experiences. For instance, *The Night of the Turtles* exemplifies how multi-tiered narratives mixing story, factual inserts, and real-life communications cater to varied interests while inviting non-linear content navigation. This layered approach provides scaffolding wherein adventure plots gradually engage readers with scientific details as curiosity grows. Pedagogically, such designs reflect differentiated learning principles and multimodal literacy, where textual, visual, and interactive elements sustain engagement. This convergence of data and narrative aligns with calls for holistic approaches to literacy and sustainability education (Campagnaro & Goga, 2021). The prevalence of hybrid narrative models, blurring the boundaries between fiction and nonfiction (Aronson & Malilang, 2025), further enhances the aesthetic and affective experience, enabling situated, contextualized understandings of ecological phenomena (Goga et al., 2021).

Also, the interactive *question-and-answer* format supports a dialogic learning model, encouraging readers to view knowledge not as fixed facts but as emerging answers from questioning and investigation (Sanders, 2018). Taddia and Palazzi's interview-style climate change book exemplifies this approach by directly addressing reader curiosity while modeling scientific response patterns. This maintains active thinking while validating wonder, showing questions' importance and worth. From eco-pedagogical standpoints, children become empowered to inquire about environmental issues rather than merely receiving alarm or instruction. Building on Sanders's account of nonfiction as a "literature of questions," our analysis shows that biographical and memoir-based strategies provide embodied exemplars that couple inquiry with models of ecological engagement (Sanders, 2018, 2024).

Communicating ecosystem complexity

The results of our analysis highlight how contemporary children's nonfiction often adopts an eco-pedagogical approach to communicate the complexity and interconnectedness of ecosystems. An example of this perspective is the previously mentioned *Lots: The Diversity*

of Life on Earth by Nicola Davies and Emily Sutton (2017), which emphasizes that humans, animals, and nature are inextricably linked. Through rich descriptions and evocative illustrations, the book explores biodiversity, showing how every organism is part of a larger whole, shaped by delicate balances and intricate interdependencies. The text reinforces the idea that humans are not separate from nature but an integral part of it, a core principle in modern ecological education. This perspective proves essential for helping children develop environmental impact awareness while challenging traditional human-nature divides (Gaard, 2009). Through rich imagery and accessible language, narratives foster intuitive understanding of ecological complexity while strengthening readers' natural world connections. Furthermore, there is growing consensus on the importance of emotional engagement and affective learning in supporting sustainable behavioral change. Recent studies suggest that when complex environmental topics are mediated through multimodal, visual, and narrative strategies, children can experience curiosity, catharsis, and hope, emotions that support resilience and motivate action rather than eco-anxiety (Oberman, 2024).

Visual storytelling particularly supports these goals. Studies suggest it evokes stronger emotions than text alone, fostering nature empathy while helping readers internalize ecological messages more profoundly (Muthukrishnan, 2019). Rybak (2023) highlights how green informational picture books employ visual and peritextual strategies engaging children in eco-activism, often framing sustainability through imperative tasks and action-driven imagery. His analysis suggests these books function as "literature of actions", encouraging behavioral change beyond knowledge acquisition alone.

Contemporary works confirm children's nonfiction employs varied strategies illustrating ecosystem complexity. In our increasingly vital sustainability education context, these books' ability to translate ecological complexity into engaging, accessible narratives makes them valuable resources shaping future generations' perspectives. *The Mess That We Made* (Lord & Blattman, 2020), portraying growing oceanic waste before transitioning to action-oriented resolution, aligns with Angelaki's (2024) planetary literacy concept emphasizing teaching children to perceive themselves as interconnected with human and non-human ecosystem entities. The book's visual narrative immerses young readers in plastic pollution consequences while simultaneously empowering them with concrete mitigation actions.

We Are Water Protectors (Lindstrom, 2020) offers another instance, narrating environmental threat resistance through compelling visual metaphors encouraging readers' ethical reflection and commitment. The narrative and imagery invite child readers to question, discover, reflect, and commit. Environmental protection needs are beautifully woven throughout narrative and visual elements. This approach aligns with ecological literacy principles (Orr, 1992) and eco-pedagogy (Gaard, 2009), preparing young readers to interpret environmental challenges as complex, dynamic systems rather than isolated issues. Beyond visual metaphors and narrative immersion, nonfiction texts can also integrate real-world observation to deepen ecological understanding. Extending accounts of verbal–visual strategies in nonfiction, we identify a dual pattern in which scientific diagramming coexists with affective visual metaphors, a combination that scaffolds children's systems thinking (Goga et al., 2021; Rybak, 2023).

Inspiring Ecological Action and Social Responsibility

A fundamental aspect of nonfiction children's literature involves fostering environmental responsibility while inspiring meaningful protective action. Our corpus examples illustrate children's nonfiction's movement toward interactive, action-driven, participatory forms.

Books like *Follow the Moon Home: A Tale of One Idea, Twenty Kids, and a Hundred Sea Turtles* by Philippe Cousteau and Deborah Hopkinson (2016) follow participatory narrative models, actively involving readers in environmental problem-solving processes while illustrating step-by-step how conservation initiatives develop. Rather than merely presenting successful case studies, texts provide practical guides for initiating local activism projects, emphasizing collaboration and collective effort importance.

Numerous books indicate pathways toward sustainable futures. In this space, children receive action suggestions accompanied by tips, inspiring quotes, visuals, infographics, interesting facts and sometimes usable attachments like seed packets, postcards, or posters. The "we are what we do" series exemplifies this approach. *Kids Fight Climate Change* (Dorey, 2022) presents planet-saving actions where children become superheroes taking on difference-making "missions".

Similarly, *Energy Island: How One Community Harnessed the Wind and Changed the World* by Allan Drummond (2024) illustrates the transformation of the Danish island of Samsø into a self-sufficient energy community through the use of renewable energy sources, showing that collective action creates real lasting change for young readers. Shifting the focus from individual responsibility to models of collective, participatory action by portraying community as the central character is particularly effective. This approach aligns with the concerns of van der Beek and Lehmann (2022), who argue that much children's environmental literature risks framing climate change in a way that alienates young readers from its systemic roots by focusing on individual actions and marginalising the structural and collective dimensions of environmental justice. Instead of promoting narratives of domination based on individual heroism, they advocate inclusive eco-pedagogical texts that foreground community, interdependence and participatory democracy. Furthermore, Echterling (2016) critiques the predominance of what she terms "at-home activism" in American children's environmental literature. These books typically promote eco-friendly behaviors confined to the private sphere, such as recycling or conserving water, while neglecting the interconnected ideological, economic, and political structures that underlie environmental crises. She argues for texts that confront systemic environmental injustices, urging children's literature to establish connections between ecological degradation, social inequalities, and corporate responsibility. In doing so, literature can cultivate a form of environmentalism that combines individual behavioral change with civic participation and political activism. Taking action also fosters psychological resilience, offering children and young people a sense of agency and hope in the face of ecological challenges. Engaging in climate activism helps youth manage feelings of anxiety and despair by transforming them into determination and optimism: "the best antidote to anxiety and despair is action" (Sanson & Bellemo, 2021, p. 207). Participating in collective efforts to address the climate crisis not only builds practical skills and self-efficacy, but also supports emotional well-being. While Sanson and Bellemo do not specifically discuss literature, it may be argued that narratives portraying empowered protagonists and collective action can similarly act as protective factors, helping young readers to process ecological concerns and imagine themselves as agents of change. Such texts could potentially facilitate a psychological shift from passive worry to constructive engagement.

What Will We Become? Reflections on Nature (Damm, 2019) adopts a contemplative strategy to foster ecological awareness in young readers. Unlike other picture books that foreground concrete examples of activism or offer practical environmental solutions, Damm's work invites philosophical engagement through a series of open-ended questions. Structured around interrogatives, it encourages readers to reflect on their relationship with the natural world without suggesting definitive answers. The minimalist text and evocative illustrations function as catalysts for personal exploration, promoting a deeper and more mindful

connection with the environment. This open-ended and reflective mode resonates with the pedagogical ethos of the New Nature Study, which emphasizes observation, inquiry, and experiential understanding as pathways to ecological literacy (op de Beeck, 2018). By nurturing independent and critical ecological thinking, the book aligns with a broader educational shift that positions children as capable agents of change, prepared to confront environmental challenges with awareness and sensitivity. As op de Beeck suggests, nonfiction picture books, when infused with affective, cognitive, and participatory strategies, can serve as powerful instruments for reconnecting children with nature and cultivating environmentally responsible citizenship. Nuancing Rybak's notion of a "literature of actions," our corpus emphasizes participatory, community-based agency rather than task-oriented imperatives, foregrounding collective responsibility.

Theoretical and practical implications

The practical implications outlined below derive directly from the three analytical dimensions identified in our study. The emphasis on narrative strategies suggests ways of integrating biographies and multilayered texts into environmental education; the representation of ecosystem complexity highlights the pedagogical power of multimodal visual-verbal approaches; and the participatory dimension demonstrates how nonfiction can support eco-pedagogical practices that foster children's sense of agency.

Contemporary nonfiction for children, whether in the form of atlases, picture books, illustrated biographies or graphic reportages, can be interpreted as part of a generative cultural ecology, an ecosystem of texts that fosters the interplay of knowledge, emotion, and action. Drawing inspiration from Najib and colleagues (2024), who outline a fourfold ecoliteracy model (cognitive, emotional, activity, spiritual), we can identify a triadic dynamic within these texts: cognitive clarity in the presentation of data and processes; emotional resonance that draws young readers into the complexity of the more-than-human world; and practical orientation that invites responsibility and action. Within this convergence of mind, heart and action, knowledge becomes a relational process that invites children to reinterpret their place within living systems (Najib et al., 2024).

This reconceptualisation of knowledge represents a paradigm shift in environmental education. Rather than transmitting set content, contemporary nonfiction normalises uncertainty by framing ecological issues as open-ended, complex and context-specific problems. By doing so, it legitimises doubt as a source of enquiry, encouraging learning that values epistemic pluralism and dialogic investigation (Häggström & Schmidt, 2020). Exposure to multiple narratives and diverse viewpoints helps readers understand that science advances through hypotheses and revisions, and that creating solutions requires collective imagination.

In a school setting, this horizon means welcoming nonfiction not as a subject to be "explained", but as a relational practice to be explored. It is through the interplay of text and territory, neighbourhood explorations, citizen science workshops and emotional mapping of places, that informational content gains existential depth and becomes a catalyst for ecological citizenship. In this context, the teacher acts as a mediator, co-constructing meaning with the class, problematising images and linking the printed page to material experiences, whether in urban or natural environments. Guided reading sessions, anchored in dialogic questioning and reflective writing, inspire deeper cognitive and emotional engagement than unmediated formats (Muela-Bermejo & Pérez-Martínez, 2024).

Projects that combine nonfiction with visual arts, science education and social studies create environments where reading becomes an investigation, dialogue becomes a way of thinking and imagination leads to the creation of tangible change. In this way, the classroom

becomes a laboratory of distributed knowledge, where different areas of expertise converge and adapt towards regenerating everyday spaces (Mascia & Mazzini, 2024).

Finally, the transformative strength of nonfiction lies in its capacity to foster eco-responsible attitudes. By offering models of agency, stories of resilient communities and practical steps, nonfiction encourages young readers to overcome inertia and cultivate critical hope, an outlook that recognises the severity of the ecological crisis yet envisages the potential for collective action to influence its trajectory (Mascia, 2024). Children are therefore not addressed as "passive beneficiaries" of top-down knowledge, but as co-authors of sustainable futures, with the ability to influence the future of our shared planet right now.

Limitations

While these selection criteria ensured a focused and methodologically sound approach, some limitations should be mentioned. The sample size of analyzed texts is limited; therefore, the findings should not be considered generalisable but rather indicative of an emerging trend.

Additionally, the study primarily examined books written in English and Italian, potentially restricting the cross-cultural application of the results. Furthermore, most of the selected texts were published in Europe and North America, which may overlook narratives from those regions rooted in non-Western ecological perspectives. Future research could expand the corpus including larger, more geographically diverse selections, providing comprehensive understanding of how children's nonfiction literature fosters ecoliteracy across different cultural contexts. We note, in line with environmental-education reviews, the likelihood of publication bias and the methodological challenges of attributing measured ecological improvements to specific educational interventions; our claims about impact are therefore intentionally cautious (Ardoin et al., 2020).

Conclusion

Returning to our guiding question: What kinds of nonfiction stories can engage young readers to develop ecological awareness and foster environmental action? The findings indicate that the analyzed titles incorporate three discursive elements into a cohesive narrative structure. They reveal the intricate interconnections of living systems through multimodal storytelling, balancing scientific accuracy with aesthetic appeal. This approach cultivates systems thinking, which is central to ecological literacy (Desmarais, 2024). They shift responsibility from individual "good habits" to the collective realm of civic action, policy innovation, and technological ingenuity. This reframing has been shown to mitigate eco-anxiety while broadening the scope of agency (Oberman, 2024; Rybak, 2023). Furthermore, they recognise the full range of emotions, wonder, curiosity, and apprehension, providing narrative spaces where distress is transformed into what recent scholarship terms 'eco-agency' (Sanson & Bellemo, 2021). When these strands converge, nonfiction ceases to be a repository of 'green facts' and becomes a creative space for envisioning regenerative futures. This enables young readers to understand ecological interconnections, feel empowered rather than overwhelmed, and imagine practical ways to transform their insights into systemic change.

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