

Biophilia As an Essential Category for the Analysis of the Human-Nature Relationship

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Abstract

Biophilia has been defined as the innate human affinity for nature, a personality trait, and a component of architecture with an environmental focus. The interdisciplinary analysis of human-nature relations places it as a crucial category in studies on well-being, sustainability, and environmental education, among others. In order to analyze the origins and evolution of the main trends in the study of biophilia, a qualitative documentary review was developed in the Scopus database. The results indicate that biophilia has become a popular category in academic circles and popular literature due to its theoretical proposal, which relates it to well-being, the enjoyment of nature, the construction of sustainable spaces, environmental ethics, and the future of humanity itself. On the other hand, challenges were also identified in using the category, specifically related to poor operationalization, limited scientific evidence, difficulties in developing standardized metrics, and poor systematization. Despite these limitations, it is concluded that biophilia can represent an important integrative conceptual framework in studying phenomena related to sustainable development, human well-being, and the proposal of innovative solutions.

Keywords: *Environnement, Environmental Awareness, Environmental Education, Ethics of Technology, Social Psychology, Sustainable Development.*

Introduction

The various relationships established between human beings and nature are integral to the very history of the species, as they are reflected in both phylogeny and ontological development. The arts, science, and popular knowledge have sought to represent how men, and more recently, with advances in the gender perspective, women, interact with, modify, and are conditioned by environmental conditions (Ghaziani et al., 2021; González Vallejo, 2023).

Depending on the discipline, the emphasis may be on resource provision, the physiological and biological impact of environmental conditions, the social construction of nature and its effects on the human psyche, among other aspects (Deckers, 2018). However, history reveals that this humanity-nature relationship has been complex and nuanced in each period, and it can be argued that since the Industrial Revolution, its connotation has been particularly damaging (Cheng et al., 2021; He & Silliman, 2019; Mahmoud & Gan, 2018). Within this framework, various theories and postulates have attempted to conceptualize the causal factors of this relationship, with minor or significant variations, but always focused on behaviors of approach and rejection toward natural elements. Some of these proposals even explore the human “essence” and the determinism it exerts on these behaviors (Deckers, 2018).

Biophilia constitutes the central category of a more or less articulated system of ideas that posits, in principle, that love for nature, of which human beings are a part, has a significant psychobiological correlate, even if sociocultural factors exert considerable conditioning (Afonso Lencastre et al., 2023). In several of these lines of thought, biophilia constitutes an instinct that influences a person's relationship with the environment, both as an individual and as a person. Therefore, its impact can be observed in emotional states, health-disease processes, learning, and other areas (Hung & Chang, 2021; Jiménez Zapata et al., 2023; Schiebel et al., 2022).

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This intricate web of human-nature relationships has attracted researchers from diverse disciplines, leading to different applications of the category and generating three major positions (Alves et al., 2022; Chang et al., 2020; Totaforti, 2020). The first of these positions is biophilic theory, which is the set of propositions that establish that love of nature is the result of a phylogenetic biological conditioning that determines the human approach to the environment, as well as its care and preservation. Although it is temporally later than the second position, biophilia as a personality trait or orientation, this group of postulates is the most popular and largely represents the central line within the literature, as will be seen in the following section.

As mentioned, the second position posits that biophilia and its dialectical counterpart, necrophilia, are two opposing forces within the psychic apparatus. The reasons for the preponderance of one over the other, while certainly having a biological component, can be found in the psychological configurations resulting from ontological development. Proposed by Erich Fromm, this unity represents a philosophical and epistemic effort to move away from the biological determinism underlying Freud's life and death instincts, but without abandoning the in-depth analysis of the human psyche (Clark, 2022).

The third set of postulates, in turn, can be epistemologically divided into two branches: the biophilic design and the biophilic hypothesis. This epistemological division stems from the fact that neither position can be considered a substantive theory in itself, and even though both have significant theoretical developments, they are applications of the first two sets of theoretical propositions.

In the first case, biophilic design arises from ideas associated with biophilia as a result of biological evolution, and its main focus encompasses efforts to achieve a design that maximizes the human-nature relationship, promotes well-being and synergistic interactions, and adds aesthetic, philosophical, and environmental values to buildings (Pistore et al., 2023; Söderlund, 2019). Based on these notions, biophilic design can be found in architecture, urban planning, tourism, and other disciplines that advocate emphasizing this connection as a way to mitigate anthropocentrism and encourage environmental care and preservation (Gunnarsson & Hedblom, 2023). In the current context, where phenomena such as climate change and its consequences, crises associated with extractive models, among others, have generated social and political movements, demands for paradigmatic change have resonated with researchers and professionals, supporting the ideas associated with biophilic design as an important line of future development (Horsthemke, 2018; Ziari et al., 2018).

In the second case, the main responses of the category's detractors can be seen, especially when it is elevated to the status of a substantive theory in the field of biology. Deeply influenced by positivism, the biophilic hypothesis can be considered the position that, both by supporters and detractors, asserts that biophilia must be falsified. It should be taken into consideration that, by establishing that biophilia constitutes a biological instinct resulting from evolution, it or its counterpart should appear consistently in large population groups. However, in both the psychobiological and psychosocial schools of thought, sufficient evidence has not been compiled to support claims of innateness, enhanced well-being, or predictable behavior (Barbiero & Berto, 2021). Consequently, rather than a theory that can be subjected to demonstration, the biophilic hypothesis offers a conceptual and philosophical framework where other fields can find plausible explanations. In addition to those already mentioned, multiple disciplines within the medical and environmental sciences have drawn on this hypothesis to argue for the importance of nature in disease prevention, the alleviation of suffering, the improvement of care, as well as environmental stewardship or the promotion of pro-environmental behaviors (Ghaziani et al., 2021; Lan & Liu, 2023).

Despite the progress made, skeptics maintain that the results of this research are deeply influenced by biases in the interpretation of the results, in the responses of the participants, and by the impact of methodological designs that do not evaluate the biophilia category itself, but rather other constructs. Among the leading causes of these shortcomings are that biophilia constitutes a complex category with unclear epistemic roots, that its use has occurred within poorly grounded interdisciplinary frameworks, and the insufficient development of standardized metrics that would allow for the verification of the hypotheses associated with it.

Consequently, the need to delve deeper into the category, its epistemic and theoretical ramifications, and the latest advances in research employing it was identified. As previous studies have shown, biophilia has the potential to transcend theoretical exercises and become a key element in integrative conceptual frameworks, grounded in well-founded interdisciplinary perspectives. Furthermore, the authors of this article argue that biophilia can underpin new practices that enable the reconnection of human beings with their environment in a way that is meaningful, sustainable, and transformative.

Methodology

The research was conducted using a qualitative document review design with the aim of analyzing the concept of biophilia as an essential category in the study of the human-nature relationship. This methodological approach allowed for a two-stage analysis. The first stage focused on the oldest documents published in the Scopus database, due to their relevance, rigor, and coverage of the most impactful scientific literature (Table 1). This strategy was complemented by an auxiliary search for texts using the Google Scholar search engine, which facilitated the triangulation of sources for those not indexed in the database but mentioned in the primary units of analysis.

Table 1. Integrated Search Strategy

Strategy representation	Source Selection and Analysis Criteria	Objectives
TITLE-ABS-KEY (biophilia)	Oldest documents. Thematic scope. Strengths and weaknesses of the initial theoretical postulates.	Identify the origin of the category. Evaluate the initial proposals.
TITLE-ABS-KEY (biophilia) AND PUBYEAR > 2014 AND PUBYEAR < 2023 AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (OA, "all"))	Most relevant documents. Most recent documents. Thematic scope.	Analyze the categorical approach. Identify interdisciplinary contributions made based on the category. Assess practical applications.

Source: Own elaboration

In the second stage, the strategy was replicated, but focused exclusively on articles published under Open Access during the period 2018–2023, in order to ensure an up-to-date examination of the main theoretical, methodological, and applied trends within the biophilia category. Additionally, in this second stage, two filters were applied to refine the search. The first identified the most relevant articles according to the Scopus algorithm, while the second allowed for the review of the most recent articles.

This search strategy employed a broad approach, aimed at gathering as many documents as possible related to the biophilia category. Therefore, the term "biophilia" was used without initial restrictions. This procedure yielded 860 documents, which were superficially analyzed based on the title and abstract, allowing for the selection of 10 particularly relevant documents. The scope of these documents enabled an examination of the origins and main theoretical debates in the initial stages. In the second stage, 188 articles were identified. The aforementioned filters were applied, and inclusion and exclusion criteria were introduced to obtain a sample that, while not representative due to epistemological reasons, did include the essential sources for analyzing new trends in the study of the category.

Table 2. Inclusion And Exclusion Criteria for Stage Two

Inclusion criterio	Exclusion criteria
Articles focused on the category of biophilia. Articles that present a debate on the origins and uses of the category of biophilia. Articles with an identifiable methodology or, failing that, with a declared and substantiated rationale. Articles that examine practical applications of the category in different contexts (broad range).	Publications that include the category in their keywords, but where the category is not key within the text. Studies that present a rationale, methodology, or similar fields (exclusion based on relevance). Studies that do not make theoretical, methodological, or practical contributions.

Source: Own elaboration

Data analysis in both stages was based on rounds of reading, beginning with individual analysis for note-taking and memos, followed by discussion and source selection sessions. As mentioned, these initial analyses focused on the title, abstract, and targeted reading of the key sections: methodology, results, and conclusions. Once the sources were selected, the analysis was conducted using a matrix that included the following elements: use of the concept, methodology, main disciplinary field, key findings, recognized challenges, and future lines of research. Using these broad, pre-established codes as a reference, each team member carried out an individual coding process, which led to the unification of the lists, the screening of codes for the development of categories, and the synthesis of these into main themes.

Results and Discussion

Historical Evolution of the Category

The etymological origin of the category lies in the combination of two words with Greco-Latin roots, whose simplest meaning is love of living things or love of life. This direction has remained the most popular, and studies seeking to explore or corroborate the biophilic hypothesis assume the postulates and developments of Wilson (1986). Recently, the study by Woods & Knuth (2023) started from these postulates, assuming that biophilia is a temperamental trait, and then proposed a conception of it as a stable attraction to biodiversity. This reveals profound conceptual shortcomings stemming from the poor integration of biological and psychological factors in attempting to explain human behavior.

The popularity of Wilson's ideas was due to the success of a well-designed science communication strategy. According to these authors, the theory of biophilia, since its original proposal by Wilson, has faced numerous difficulties, especially those related to gathering confirmatory empirical evidence. Therefore, the transformation of the theory into a hypothesis, presented in the book "The Biophilia Hypothesis" (S. R. Kellert & Wilson, 1995), allowed it to be adopted in multiple disciplines, forming the basis of current research that employs the category.

Criticism is also leveled at the adaptive distinction of this line of thought, based on limited empirical evidence, the neglect of confirmatory arguments, the poverty of theoretical frameworks, and the dependence on evolutionary psychology as the leading science in this field. Biophilia, more than a category, constitutes a system of ideas organized around postulates related to nature, but which, ultimately, are explicable at an ontological level and in consideration of all the factors that condition this inclination, not exclusively adaptive or behavioral ones (Zare et al., 2021). However, this position shows important sub-lines in its temporal development. Issues such as the aesthetic and ethical value of the humanity-nature relationship, and the salutogenic and environmental benefits of interactions.

The second approach, primarily associated with the psychosocial interpretation of biophilia (as a personality trait), attributes the proposal to Erich Fromm, who, since his book "The Dogma of Christ," has been interested in human tendencies toward love, destruction, and the instinctive or innate nature of these inclinations (Fromm, 1963). In these early approaches, Fromm (1963) starts from the antagonistic concept

of necrophilia, explaining it as a perversion resulting from a love of death and reflected in the pleasure derived from destructive behavior. However, it is in "The Heart of Man: Its Genius for Good and Evil" that he further develops his discussions on evil, human decisions, and love (Fromm, 1964).

Fromm's main contribution lies in his position regarding necrophilia and biophilia, not as personality traits, but as orientations within them, even though the literature has maintained the former theoretical position and assumed them as such (Barbiero & Berto, 2021; Mehrvand & Karmatfar, 2022). This integration of orientations not only constituted a step forward with respect to Freud's work; it also established the basis for an interdisciplinary examination of character formation and the determinants of human behavior.

Biophilia is expressed in bodily processes, emotions, cognition, and the whole being, suggesting that it constitutes a stable (biophilic) tendency. During the evolution of this line of thought, his seminal work was considered by various authors to be the foundation of a critical and humanistic theory of human-nature relations, with implications not only for the study of psychological and environmental phenomena, but also for economic, social, and ethical ramifications.

In the initial stages of biophilia analysis from this perspective, the main criticisms were related, coincidentally, to the category's capacity to explain dissimilar behaviors derived from the original principle. For example, one application of this approach was criticized for arguing that the scale used did not truly assess biophilia (as love of life). However, it was more sensitive to political and philosophical positions, making it a useful concept for political discourse but not explanatory in the analysis of human behavior.

The third line of inquiry comprises studies that take the two previous directions, recognizing the postulates on evolution and biophilia within the psychosocial and historical-cultural structure of human-nature relations. In these terms, it is proposed that nature should be understood not as an indefinite vastness, but as an umbrella concept that encompasses the values associated with why the environment is important to humanity, the representations and imaginaries associated with nature, and the very images of the relationship between them, which ultimately synthesize the roles of both. An example of this stance is the study that adds a new interpretation, which argues that, in scenarios of disaster and danger, human beings find in nature a source of hope and resilience, as observed in individuals, communities, and large populations, according to this author.

Challenges and Opportunities

At a theoretical level, the main challenge identified was conceptual unification, not because there was considerable overlap in the definition, but because the systems of ideas that begin with the innatist, topological, or joint premise of personality quickly separate and diverge depending on the researchers' objectives or positions. This divergence causes the essence of the category to become entangled in convoluted debates that frequently lean more toward examining key authors and their ideas than toward the theoretical development of biophilia.

The clearest example of this discrepancy is the "coexistence" of multiple related hypotheses and theories that, when mentioned, coexist without a clear degree of substantive hierarchy or causality. The research identified four major postulates: the Savannah hypothesis, the prospector-refugee theory, the stress-recovery theory, and the habitat theory. This plurality prevents the debates from reaching concrete conclusions and leads to the reproduction of concerns, criticisms, and hopes. Within this context, only biophilic design appears to have reached a stage of agreed-upon practical application, even if concerns about the general theory remain. Biophilic design is the practical culmination of biophilia-related postulates, as it constitutes an intentional attempt to incorporate the ideas of affinity into the construction of exercises. Although developed not only by the author himself but also by numerous others, the evidence confirming the hypothesis is inconclusive (Gaekwad et al., 2022; S. Kellert, 2016).

This conceptual diversity diminishes the category's impact when addressing specific problems, as the framework can be too broad or abstract to generate clear guidelines for public policy or concrete interventions—two fundamental processes that currently depend on scientific evidence. Furthermore, the

aforementioned intersection with other concepts (sustainability, well-being, resilience) generates theoretical redundancies or overlaps that hinder its use as an independent construct, mainly when biophilia is used utilitarianly.

Methodologically, the challenges are equally considerable, primarily because studies aimed at resolving epistemic and theoretical critiques have tended to collect data in cross-sections (transactionally), which incurs two of the major limitations mentioned in the previous section: decontextualization and the inability to demonstrate conclusive evolutionary traces. Given the very arguments that the effects of nature on people are observable and generalizable, data collection to verify biophilia as a result of adaptation has relied on perceptions and reactions. Therefore, determining what type of adaptation, as well as the specific contexts of interaction with nature, could condition what is understood as biophilia and its manifestations.

Perhaps the clearest example is that the techniques, both those that assume biophilia as a trait and those that assume biophilia as an adaptation, depend on self-reports or scales susceptible to bias, both in their design and in their completion. This reliance on subjectivity often leads to criticism of measurement instruments for their lack of precision. However, in the case of qualitative approaches, these cannot be generalized or replicated, causing criticisms to shift to unresolved epistemological debates.

In this sense, the main opportunities may lie in developing projects that move from interdisciplinarity to transdisciplinary positions. These complex approaches could provide the necessary mechanisms for theoretical and methodological integration to study biophilia in multiple contexts and from multiple perspectives. The main challenge here is developing a single, coherent conceptual framework from which to operationalize a robust mixed-methods methodology that, even if it cannot be replicated, can at least produce results transferable to similar scenarios.

This practical dimension was precisely the last one examined in terms of opportunities and challenges. First, the balance between costs and benefits, in terms of biophilic design, is a questionable factor, since, paradoxically, materials and processes with a lower ecological impact tend to require more funding. This limitation not only appears in construction; three additional significant difficulties related to financial resources were identified: maintenance costs, greater space requirements, and risky financial-organizational decisions (Andreucci et al., 2021; Pérez Gamboa et al., 2022).

On the other hand, conceptual and methodological limitations also impact the development of these projects, since in practice they are carried out without defined models or standards, the tradition of interventions does not provide sufficient data, and the outcome depends on collective perception (Aristizabal et al., 2021). Regarding the benefits, both the analyzed studies and the triangulation suggest that the introduction of projects with biophilic design could favor the cognitive (development of creativity, increased productivity), affective (mitigates the effects of stress, contributes to coping with psychological disorders, possesses curative/restorative potential), and behavioral (pro-environmental behavior, physical activity, promotes an inclination towards social interaction and other forms of life) dimensions (Barbiero et al., 2021; DeLauer et al., 2022; Gaekwad et al., 2023). In this sense, several studies found that biophilic design promoted focus, reduced the effects of digital dependency, and increased cognitive efficiency (Emamjomeh et al., 2020; Jung et al., 2023; Mollazadeh & Zhu, 2021).

Finally, the main challenge identified in implementing biophilic design projects was the training of the personnel involved and the prior awareness-raising of the target populations (Sadick et al., 2023). In both architecture and education, the execution of biophilic design initiatives requires that all stakeholders master the essential tenets of biophilia and its antagonistic categories (necrophilia and biophobia), understand its potential and weaknesses, and be aware of the threats that affect this type of project (Lefosse et al., 2023; Wijesooriya et al., 2023). Legal, environmental, and systematization issues for future editions (education) or maintenance (architecture and design) are particularly noteworthy (S. R. Kellert, 2018).

In conclusion, it is stated that these limitations are not insurmountable obstacles, as biophilia offers opportunities to strengthen the concept and its application in urban, rural, interior, and virtual environments. On a theoretical level, a precise delimitation of the scope and operational definition of

biophilia is needed so that coordinators, decision-makers, and those involved in its implementation can differentiate it from related concepts without losing its integrative essence. Methodologically, it is crucial to develop more precise and multidimensional tools that capture the richness of the phenomenon and allow for its comparison over time and across populations (Blom et al., 2020). Regarding its introduction into practice, financial, cultural, legal, environmental, and ethical limitations must be considered. Furthermore, biophilic interventions require innovative strategies adapted to each context and with a focus on sustainability.

Biophilia is a key category in the study of human-nature relationships and allows for the multidimensional exploration of their implications (Kallio, 2023). Furthermore, the idea was confirmed that, by integrating the innatist-adaptive, sociopsychological-cultural, and design-application perspectives, biophilia represents a complex conceptual framework for examining the problems affecting humanity, as well as fostering the development of contextualized solutions (Mohammed et al., 2023). With a view to future developments, it is critical to transform this conceptual framework into robust methodologies that facilitate data collection to guide policies and practices (Olivos-Jara et al., 2020).

Another relevant finding was the opportunities that biophilia offers for rethinking contemporary environmental education and preparing new generations to ethically address the social, environmental, and worldview challenges of their time (Cho & Lee, 2018; Panlasigui et al., 2021). In this direction, conscious processes of awareness-raising and preparation of educational agents are needed, along with the introduction of the category into curricula and the development of experiences that link environmental preservation and the development of key competencies (Watchman et al., 2021; Wijesooriya & Brambilla, 2021). Biophilia, as an analytical category, offers a solid foundation for reimagining human-nature dynamics, fostering more sustainable, conscious, and resilient societies (Gómez Cano et al., 2022; Soga & Gaston, 2021).

Given the limitations of this study, stemming from its qualitative design, further bibliometric and scientometric reviews of the field are recommended, as only partial studies were observed. This approach could facilitate a broad representation of the three perspectives that converge in the study of biophilia, as well as a mapping of the central tenets.

Conclusions

Biophilia emerges as a fundamental concept for understanding the connection between humans and nature from diverse perspectives. By combining approaches ranging from the innate and adaptive to the sociocultural and applied, it provides a solid foundation for addressing global problems and designing solutions tailored to each context. However, it is essential to put this theory into practice by developing effective methodologies that generate valuable data to guide policies and concrete actions. Furthermore, biophilia presents a unique opportunity to transform environmental education, preparing future generations to face ethical, social, and ecological challenges. This requires raising awareness among educators, integrating this approach into curricula, and promoting experiences that connect environmental protection with the development of essential skills, thus contributing to building more conscious and resilient societies.

On the other hand, the study acknowledges certain limitations due to its qualitative approach, suggesting the need for bibliometric and scientometric analyses to obtain a more comprehensive view of the field. These reviews could identify key trends and represent the various perspectives that converge in the study of biophilia. Furthermore, it is proposed to conduct long-term empirical research that explores, describes, interprets, and explains the related phenomena. Finally, longitudinal empirical research is recommended to allow for a transition through the different methodological approaches: exploration, description, interpretation, and explanation. It is important to emphasize that, in the opinion of the authors of this study, this methodological rationale demands complex mixed-methods designs that combine sequential and integrative strategies in order to test hypotheses and delve deeper into the interpretation of the results.

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