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Impact of environmental awareness programs (2018-2025): a systematic review

Impacto de los programas de conciencia ambiental (2018-2025): revisión sistemática

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Abstract

The objective of this study was to evaluate the impact of environmental awareness programs in Latin America. The PRISMA methodology was used for systematic review in international databases such as Proquest, Scopus, SciELO, and Science Direct in Latin American countries with quantitative, qualitative, or mixed studies. A total of 721 records were obtained, which were filtered according to inclusion and exclusion criteria, leaving 31 final articles. The main results showed that the programs implemented can have a positive impact not only on students but also on other actors in society. In the cognitive sphere, there was evidence of increased environmental awareness and improved scientific skills. In the behavioral sphere, positive results were observed in sustainable practices such as safe pesticide management, waste reduction, and ecosystem conservation. Likewise, improvements were noted in motivation and pro-environmental attitudes, which drove active community participation and social organization for environmental protection. It is concluded that the study has relevant implications for fostering social responsibility and promoting sustainable development in the region.

Keywords: environmental education, environmental management, environmental awareness

Resumen

El objetivo del presente estudio fue evaluar el impacto de los programas de conciencia ambiental en Latinoamérica. Se empleó la metodología PRISMA para la revisión sistemática en bases de datos internacionales como Proquest, Scopus, SciELO y Science Direct en los países de Latinoamérica con estudios cuantitativos, cualitativos o mixtos. Se obtuvieron un total de 721 registros, de los cuales se filtraron por criterios de inclusión y exclusión, quedando 31 artículos finales. Los resultados principales reflejaron que los programas implementados pueden tener un impacto positivo no solo en estudiantes, sino también en otros actores de la sociedad. En la esfera cognitiva, se evidenció un aumento de la conciencia ambiental y una mejora de las habilidades científicas. En el ámbito comportamental, se observaron resultados positivos en prácticas sostenibles como el manejo seguro de pesticidas, la reducción de residuos y la conservación de ecosistemas. Asimismo, se registraron mejoras en la motivación y en las actitudes proambientales, lo que impulsó la participación comunitaria activa y la organización social para la protección del medio ambiente. Se concluye que el estudio tiene implicaciones relevantes para fomentar la responsabilidad social y promover el desarrollo sostenible en la región.

Palabras clave: educación ambiental, gestión ambiental, sensibilización ambiental

Introduction

Environmental awareness has become increasingly significant, particularly in Latin America and the Caribbean, a region deemed vulnerable to climate change, housing nearly 60% of the world's biodiversity and freshwater resources (Insight Crime, 2025). However, this natural wealth faces constant threats, especially concerning agriculture and biodiversity (Banco Interamericano de Desarrollo, 2023). For instance, 2024 was

recorded as the hottest year in Central America and the second hottest in South America, alongside the occurrence of hurricanes, wildfires, droughts, and floods that affected local communities (Naciones Unidas, 2025). Additionally, the region is grappling with high rates of deforestation and biodiversity loss in the Amazon, Gran Chaco, and Maya Forest (Insight Crime, 2025). Hence, addressing these issues requires a strong commitment to actively combat environmental challenges in the region Banco Interamericano de Desarrollo, 2023).

Overall, there is a pressing need for studies on environmental awareness, particularly in light of initiatives based on the 2030 Agenda for Sustainable Development and the Paris Agreement (Cruz, 2022; Naumenko & Kozyreva, 2021). Recent reports suggest that Latin America has yet to meet the targets outlined in these agreements (Pataca & Flores, 2022). Previous studies have examined models that integrate dimensions such as knowledge, attitudes, and practices related to environmental awareness (Rivas et al., 2025). Recent systematic reviews confirm that environmental awareness is not only an ecological concept but is also framed within holistic approaches. These approaches underscore the necessity of developing cognitive, affective, conative (willingness to act), and active (behavioral) dimensions to enhance environmental education (Arévalo Cuz et al., 2022; Rivas et al., 2025).

Thus, environmental awareness emerges as a critical competency for understanding and mitigating both global phenomena and local environmental issues. It necessitates investment in robust ecological consciousness to foster recovery actions and the sustainability of ecosystems (Arévalo Cuz et al., 2022; Benavente Villafuerte, 2023). Environmental awareness programs can empower individuals towards sustainable behaviors (Cruz, 2022; Yupanqui-Guevara & Leyva, 2024). Nevertheless, the current reality and future prospects for optimal coexistence with the environment appear relatively pessimistic, as the responsibility for protection is often ascribed to external agents instead of individual actions (Páramo et al., 2015).

In Latin America, while various environmental awareness programs exist, many lack avenues for reflection on personal environmental actions (Benavente Villafuerte, 2023). Their efficacy may also be hindered by insufficient governmental commitment to implementing educational strategies aimed at strengthening environmental consciousness (Cruz et al., 2022). However, when properly implemented, these programs have demonstrated improvements in knowledge, attitudes, and pro-environmental behaviors (Medina-Arboleda & Páramo, 2024; Yupanqui & Leyva, 2024). In Colombia, some school projects exhibit weaknesses due to a lack of understanding of their thematic axes (Cruz, 2022). Therefore, effective environmental protection actions must take multiple dimensions into account (Medina-Arboleda & Páramo, 2024; Román Núñez & Cuesta Moreno, 2016).

Environmental awareness is recognized as a multifaceted phenomenon, encompassing knowledge (cognitive dimension), feelings or concerns (affective dimension), willingness to act (conative dimension), and actual behaviors (active or behavioral dimension) aimed at caring for ecosystems (Arévalo Cuz et al., 2022; Yupanqui & Leyva, 2024). It is imperative to integrate these dimensions, acknowledging that knowledge alone does not ensure behavioral change (Román Núñez & Cuesta Moreno, 2016). Effective programs must emphasize local contexts, interdisciplinary interaction, and direct engagement with nature (Medina-Arboleda & Páramo, 2024).

In this regard, despite significant efforts from international organizations and a certain emphasis on environmental education, gaps in understanding the effectiveness and sustained impact of environmental awareness programs in Latin America remain. Consequently, the following research question was proposed: What is the impact of environmental awareness programs in Latin America (2018-2025) on knowledge, attitudes, behaviors, and community/institutional indicators?

Methodology

This study was conducted according to the PRISMA 2020 method, which aims to synthesize literature based on environmental awareness in Spanish-speaking countries from 2018 to 2025. The following characteristics were proposed for the studies to be included: published within the last seven years (from 2018 to 2025), preferably scientific articles, focusing on research from Latin America and Spain. Moreover, both quantitative and qualitative or mixed methods addressing environmental awareness programs or interventions were included without age exclusions. Exclusion criteria eliminated sources such as theses, opinion pieces, books, systematic reviews of any type, letters to the editor, and articles in languages other than Spanish, English, and Portuguese.

Article records were retrieved from recognized databases: Proquest, Scopus, SciELO, and Science Direct. Searches were conducted within each database in September 2025. A total of 721 initial articles were identified, of which 31 were ultimately selected based on the previously stated criteria.

To locate relevant studies, combinations of keywords in both English and Spanish were entered into the search boxes of each database, including terms such as: "Intervention," "Program," "Environmental awareness,"

"Sustainability awareness," "Environmental concern," "Environment," "Knowledge," "Cognitive," "Attitude," "Change," and "Effect." Filters by date and country were applied during this step.

The articles were reviewed as follows: initially, abstracts were read, followed by an examination of the full texts, leading to the final inclusion of studies in the review by two researchers. The Rayyan tool was used for screening, where duplicates were filtered out and articles were subsequently assessed based on full readings. Finally, article records were organized into matrices with columns using Excel. This tool facilitated the synthesis of substantial information, highlighting aspects such as author-year, journal, country, method, and findings.

Results

Figure 1

PRISMA diagram of selected final records

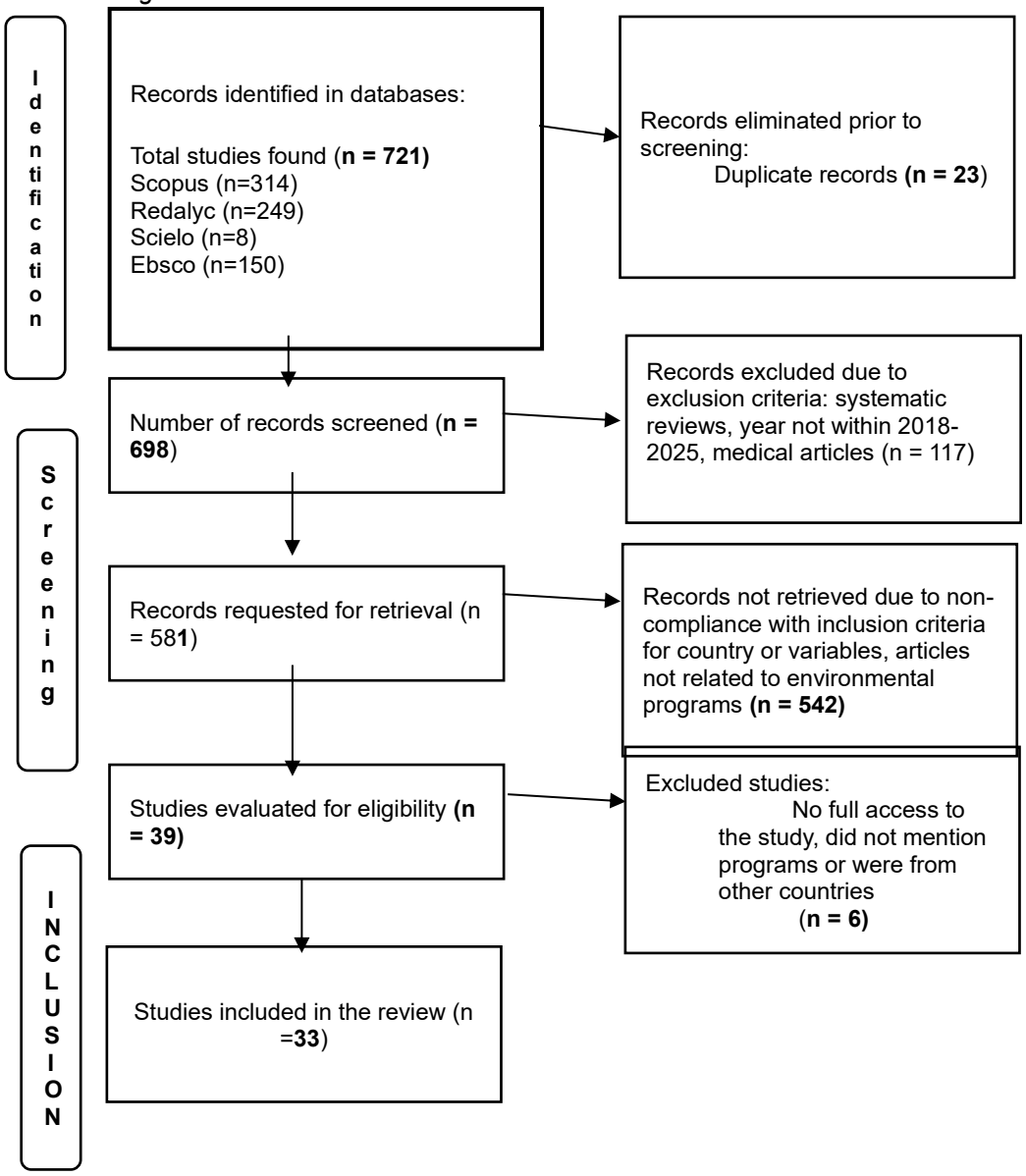


Table 1

Studies on environmental awareness programs and synthesis

No.	Author-Year	Country	Method	Findings on environmental awareness
1	Benítez et al. 2019	Ecuador	Qualitative	Generated awareness of environmental and community health, fostering an inclusive environment and improved interaction among students, teachers, and the community.
2	Carvajal Oses et al. 2023	Costa Rica	Mixed	Cognitive, behavioral, motivational, and community impact. Developed skills, strong commitment to mangrove conservation, and community participation in environmental protection.
3	Cañón-Vargas et al. 2025	Colombia	Qualitative	Impact on environmental awareness and scientific skills among children. Fostered identities as "guardians."
4	Beraún-Espíritu et al. 2024	Peru	Quantitative	Cognitive, behavioral, motivational, and community impacts: evolution of students' environmental awareness.
5	Brito-Rivero & Castillo-Gonzales 2018	Cuba	Mixed	Cognitive, behavioral, and community impact: strengthened environmental awareness and achieved sanitation of areas affected by solid waste.
6	Collado et al. 2020	Spain	Quantitative	Increased children's environmental attitudes but did not impact environmental behaviors.
7	Aristizábal Cuellar et al. 2025	Colombia	Mixed	Heightened awareness of negative consequences and environmental benefits; identified barriers such as apathy and lack of infrastructure, with potential for future behavioral changes.
8	Holguin-Alvarez et al. 2023	Peru	Quantitative	Improvements in scientific skills, knowledge, observation, and environmental awareness.
9	de Pontes et al. 2022	Brazil	Qualitative	Mitigated impacts through social organization and behavioral change, indicating holistic impact.
10	Figueroa Sánchez & Cruz-Morales 2019	Mexico	Qualitative	Community behavioral and motivational impact: achieved outcomes in waste management. Persistent distrust and disinterest hindered complete governance.
11	Alarcon et al. 2025	Peru	Mixed	The ABCCI game reinforced knowledge and commitment to sustainability, leading to positive effects on competencies, immersion, emotions, and responsible behaviors.
12	Bopp et al. 2019	Chile	Quantitative	Program incentives impacted extrinsic motivation of farmers with low motivation towards sustainable practices; ineffective for those highly motivated.
13	Díaz-Mendoza & Sánchez 2019	Colombia	Mixed	Achieved positive changes in knowledge and attitudes, sensitizing the educational community through playful experiences.
14	Giglio et al. 2022	Brazil	Quantitative	Best practices program reduced harmful behaviors of divers (low contact rate), minimizing negative reef impacts without compromising high satisfaction.
15	Hoyos et al. 2024	Brazil	Qualitative	Fostered critical thinking, creativity, and environmental commitment, enabling children to internalize content meaningfully rather than mechanically.
16	Ferragut Reinoso et al. 2018	Cuba	Mixed	Increased awareness among local actors and promoted environmental culture. Stimulated social commitment to sustainable development; a significant portion of the community was unaware of environmental issues.

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17	Ramm et al. 2018	Brazil	Qualitative	Increased environmental awareness, improved waste segregation practices, and fostered shared responsibility.
18	Gallardo & Martínez 2021	Cuba	Mixed	Cognitive, behavioral, motivational, and community impact: new environmental awareness, sustainable resource use, achieving a positive trend in social participation.
19	Sánchez-Gervacio et al. 2021	Mexico	Mixed	Educational intervention positively impacted knowledge and practices: improved pesticide management and correct disposal of containers among farmers.
20	García et al. 2021	Argentina	Mixed	Community and behavioral impact: changed attitudes and behaviors towards environmental responsibility (e.g., reduced fishing debris) through citizen participation and an inclusive approach.
21	Prosser Bravo et al. 2022	Chile	Mixed	Focused on emotions (anger, fear, despair) and participants' perspectives on education for climate change and desired future strategies.
22	Muñoz-Quezada et al. 2019	Chile	Quantitative	Educational intervention heightened risk perception of pesticides in children and adults, but did not immediately reduce urinary metabolite levels, suggesting no reduction in exposure.
23	Rungruangsakorn et al. 2024	Chile	Mixed	Generated positive changes in habits and behavior among officials (recycling, use of paper), though not generalized.
24	Rios Rios et al. 2019	Peru	Quantitative	Impacted cognitive, affective, and behavioral aspects of the population, altering how they thought, felt, and acted regarding environmental protection and risks.
25	Yangali Vicente 2021	Peru	Qualitative	Strengthened students' ecological behavior, succeeded in waste treatment actions, recycling, increasing green spaces, and conserving water and energy, with family commitment.
26	Ramirez-Ordoñez et al. 2021	Colombia	Quantitative	Cognitive and behavioral impact: increased pro-environmental competency among children (with a greater focus on knowledge). Behavioral changes observed, such as discouraging harmful environmental actions.
27	Leal et al. 2020	Mexico	Quantitative	Focused on factors influencing the success of green purchasing policies in Mexican municipalities.
28	Mihura et al. 2021	Colombia	Qualitative	Community impact, positive behavior: promoted sustainable development and achieved innovative integration of cultural and natural aspects.
29	Ruiz-Corro et al. 2024	Peru	Quantitative	Impact on cognitive, affective, and active dimensions. Positively transformed ecological attitudes and behaviors, with 80.6% of students at outstanding levels.
30	Raimondo et al. 2018	Argentina	Qualitative	Cognitive, behavioral, motivational, and community impact, mobilizing the community and generating empowerment. Reduced educational vulnerability.
31	O'Ryan et al. 2023	Latin America	Quantitative	Weak sustainability of post-COVID-19 recovery programs in Latin America, failing to effectively promote sustainable development or ecological recovery.
32	Laso Salvador et al. 2019	Spain	Quantitative	The program improved environmental awareness in cognitive and active dimensions (behavior), but did

				not show significant changes in beliefs and feelings of responsibility.
33	Tomas et al. 2025	Peru	Qualitative	Cognitive, behavioral, motivational, and community impact. Promoted recycling, teamwork, and active participation.

Relevant frequencies

Among the 33 reviewed studies, geographic representation is notable, with a prevalence in countries such as Peru (7 articles), Colombia (5), Brazil (4), Chile (4), Mexico (3), Cuba (3), Argentina (2), Spain (2), Costa Rica (1), and 2 studies covering multiple countries. In terms of methodology, environmental intervention studies prevail, employing quantitative (12), qualitative (10), and mixed methods (11). Yearly publication trends indicate a steady increase: 2018 (4), 2019 (7), 2020 (2), 2021 (6), 2022 (3), 2023 (3), 2024 (4), and 2025 (4), suggesting an upward trajectory in research activity in recent years.

Cognitive environmental awareness

The cognitive dimension was the most frequently addressed, reporting improvements in participants' environmental knowledge. Interventions in Peru, Colombia, Brazil, and Cuba demonstrated that educational programs increased scientific literacy, sustainability practices, waste management, and risk perception (Ruiz-Corro et al., 2024; Ramírez-Ordoñez et al., 2021; Ramm et al., 2018). These findings often prioritize knowledge as a foundation for changing attitudes and behaviors.

Behavioral environmental awareness

Changes in habits related to recycling, safe pesticide management, and reduction of negative environmental impacts were reported (Giglio et al., 2022; Gallardo & Martínez, 2021; Yangali Vicente, 2021), primarily within school and rural communities in Peru, Colombia, Mexico, and Brazil. Responsible practices were achieved through active participation and playful strategies.

Affective environmental awareness or attitudes

Fewer studies included the affective dimension, but those that did reported improvements in attitudes and motivation toward environmental protection, particularly among children and rural communities (Collado et al., 2020; Alarcón et al., 2025; Bopp et al., 2019). In Spain, Chile, and Colombia, programs sensitized participants to emotionally commit to environmental issues. However, persistent barriers such as distrust and apathy limit long-term impacts (Figueroa Sánchez & Cruz-Morales, 2019; Aristizábal Cuellar et al., 2025).

Community environmental awareness

Community awareness emphasized social strengthening and community participation in environmental management (Benítez et al., 2019; Raimondo et al., 2018; García et al., 2021). In Cuba, Argentina, and Peru, programs promoted collaboration among social organization actors to address environmental challenges. These results have the potential to generate replicable impacts.

Discussion

The extracted results demonstrate that it is possible to formulate and implement programs aimed at enhancing environmental awareness, yielding positive effects across cognitive, behavioral, motivational, and community dimensions. The quantitative and interventionist approach predominates, highlighting that structured pedagogical strategies generate significant changes in knowledge and attitudes toward the environment (Guerrero, 2023). These programs are effective not only in disseminating information but also in promoting concrete actions for the conservation and responsible management of natural resources.

In contrast, less prevalent and non-interventionist studies report limitations in behavioral changes and the sustainability of results. Initiatives based solely on extrinsic incentives show limited efficacy among populations with low intrinsic motivation (Bopp et al., 2019), while the lack of pedagogical planning and social apathy impede the consolidation of environmental awareness, especially in contexts of high extractive pressure and minimal remediation efforts (Guerrero, 2023; Román Núñez & Cuesta Moreno, 2018).

These findings align with multidimensional models that consider cognitive, affective, conative, and active areas as pillars of holistic individual development (Rivas, 2025). Programs addressing these dimensions achieve the internalization and practice of ecological values, especially when involving educational agents, families, and promoting interdisciplinary approaches within the curriculum (Guerrero, 2023). However, some studies warn that the behavioral impact is lower than cognitive impact, suggesting the need to reinforce strategies that motivate sustained action (Collado et al., 2020).

This review contributes to demonstrating that environmental awareness transcends mere school sensitization and extends into everyday practices across various sectors (Guerrero, 2023; Mendoza-Peña et al., 2023). Successful dive programs have been reported, which reduce damage to coral reefs (Giglio et al., 2022), as

well as agricultural projects that enhance the safe handling of pesticides, the use of protective gear, and the treatment of toxic containers (Sánchez-Gervacio et al., 2021). Additionally, shifts in habits among public officials regarding recycling have been documented (Rungruangsakorn et al., 2024), along with social organization initiatives promoting sustainable behaviors (De Pontes et al., 2022). Other efforts are transforming attitudes toward fishing debris through citizen participation (García et al., 2021) or fostering the protection of ecosystems such as mangroves (Carvajal Oses et al., 2023).

Finally, limitations were identified, such as the scarcity of longitudinal studies measuring long-term behavioral and motivational changes, as well as the limited integration of various transformative agents. Although educational programs achieve significant progress, it is essential to consolidate actions that extend beyond the school setting and to promote a sustainable environmental culture at all social levels (Guerrero, 2023).

Conclusions

Overall, interventions in environmental awareness can demonstrate a positive impact on the development of knowledge and understanding of ecological issues. They significantly enhance comprehension and promote the adoption of pro-environmental attitudes and behaviors. These results encourage individual responsibility and active community participation in conservation and sustainable development. At the attitudinal level, they foster favorable values and predispositions toward environmental protection. Behaviorally, they induce responsible and sustainable practices, though behavioral changes are often gradual and require continuous efforts. Both individual and collective motivation are strengthened through commitment to environmental initiatives. Furthermore, community participation increases, facilitating collaboration and a sense of belonging. These advances contribute to building a more robust environmental culture. Nevertheless, future research should seek to integrate these broader conceptualizations into the understanding and beneficiaries of environmental awareness.

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