





# Curricular principles for wildlife education in Colombia

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## Abstract

As vital parts of ecosystems and sentient beings, wildlife should be a primary focus of education. However, the processes associated with its teaching are limited both at the normative and theoretical levels. Therefore, it is necessary to generate educational actions to include it in school curricula, especially in contexts such as Colombia, where biodiversity is among the highest in the world. The objective of this study is to formulate curricular principles for the teaching of wildlife based on ecopedagogy and bioethics. We implemented the PRISMA method for the collection of information and grounded theory for the configuration of new theoretical elements. The main findings consist of linking the principles of micro- and macrobioethics with those of ecopedagogy for the definition of curricular principles that seek to effectively and contextually integrate the teaching of wildlife in school practices. By incorporating these principles, the study aims to promote a deeper understanding and appreciation of wildlife among students, fostering a sense of responsibility and stewardship for the natural world.

**Keywords:** bioethics; curriculum; pedagogy; principles of education; students; teaching; wildlife conservation

## Principios curriculares para la educación sobre la fauna silvestre en Colombia

### Resumen

Como partes vitales de los ecosistemas y seres sintientes, la fauna silvestre debe ser un foco primordial de la educación, sin embargo, los procesos asociados a su enseñanza son limitados tanto a nivel normativo como teórico. Por lo tanto, es necesario generar acciones educativas para incluirla en los currículos escolares, especialmente en contextos como el colombiano, donde la biodiversidad se encuentra entre las más altas del mundo. El objetivo de este estudio es formular principios curriculares para la enseñanza de la vida silvestre basados en la ecopedagogía y la bioética. Se implementó el método PRISMA para la recolección de información y la teoría fundamentada para la configuración de nuevos elementos teóricos. Los principales hallazgos consisten en vincular los principios de la micro y macrobioética con los de la ecopedagogía para la definición de principios curriculares que buscan integrar efectiva y contextualmente la enseñanza de la vida silvestre en las prácticas escolares. Mediante la incorporación de estos principios, el estudio pretende promover una comprensión y apreciación más profundas de la vida silvestre entre los alumnos, fomentando un sentido de responsabilidad y administración del mundo natural.

**Palabras clave:** bioética; plan de estudios; pedagogía; principios de la educación; estudiantes; enseñanza; conservación de la fauna salvaje

## Princípios curriculares para a educação sobre a vida selvagem na Colômbia

### Resumo

Como partes vitais dos ecossistemas e seres sencientes, a vida silvestre deveria ser o foco principal da educação; no entanto, os processos associados ao seu ensino são limitados, tanto em nível normativo quanto teórico. Portanto, é necessário gerar ações educacionais para incluí-la nos currículos escolares, especialmente em contextos como o da Colômbia, onde a biodiversidade está entre as mais altas do mundo. O objetivo deste estudo é formular princípios curriculares para a educação sobre a vida selvagem com base na ecopedagogia e na bioética. O método PRISMA foi implementado para a coleta de dados e a teoria fundamentada para a formação de novos elementos teóricos. As principais conclusões consistem em vincular os princípios da micro e macrobioética com os da ecopedagogia para a definição de princípios curriculares que buscam integrar de forma eficaz e contextual a educação sobre a vida selvagem nas práticas escolares. Ao incorporar esses princípios, o estudo tem como objetivo promover uma compreensão e uma apreciação mais profundas da vida selvagem entre os alunos, estimulando um senso de responsabilidade e administração do mundo natural.

**Palavras-chave:** bioética; currículo; pedagogia; princípios da educação; estudantes; ensino; conservação da vida selvagem; educação; conservação da vida selvagem

## Introduction

The serious anthropic impacts on ecosystems and their constituent elements, such as wildlife, require urgent actions not only to curb environmental imbalances but, more importantly, to give relevance to the consideration of this important animal group both as sentient beings and as a natural resource and socioeconomic alternative for human populations in terms of food security, job opportunities and poverty reduction (CITES Secretariat, 2022). While it is evident that cultural transformation requires addressing the issue through education in school settings, theoretical and normative advancements that incorporate wildlife into educational discourses remain in their early stages.

At the international level, the Stockholm Declaration on the Human Environment (Organización de las Naciones Unidas – ONU, 1972), the Convention on Biological Diversity-CBD (ONU, 1992), the Agenda 2030 in 2018 (ONU & CEPAL, 2018), among others, have recognized the importance of wildlife as an essential natural resource for the survival of human beings due to its various uses, and therefore, the importance of its conservation. However, shortcomings are evident when approaching the problem from a educational point of view, which also affects the teaching processes.

In Colombia, aligned with international standards, educational and environmental policies emphasize the importance of wildlife and the need for educational initiatives that promote its understanding and protection, as established in the Political Constitution of 1991 (Constitución Política de Colombia, 1991), Decree Law 2811/74, the General Education Law (Law 115/94), and the National Environmental Education Policy (Ministerio del Medio Ambiente & Ministerio de Educación Nacional, 2002). However, it is necessary to indicate that, in addition to conceiving wildlife as a natural resource of public utility, Colombian legislation, starting with Law 84/89, but particularly Law 1774/16, also recognizes the status of sentient beings in order to protect them from pain, suffering and any mistreatment caused by human activities, which makes it even more relevant as a subject that needs to be addressed in educational environments.

The necessary deepening of theoretical elements conducive to the inclusion of wildlife in school curricula leads to the necessary linkage of bioethics and ecopedagogy as references that lead to a pedagogical, ethical and moral reflection of the teaching processes, which recognize this important animal group from its double valuation, as a natural resource and as a sentient being, in addition to being visualized as an important productive opportunity through zooculture (Estrada, Gómez & Sánchez, 2023), relevant for the sustainability of human populations.

Emerging from the imperative to bridge science and the humanities in response to accelerating techno-scientific advances (Potter, 1971), bioethics serves as a philosophical framework for examining the human-wildlife relationship to enhance planetary well-being. For Beauchamp and Childress (1979), the four principles from microbioethics, an exclusive trend for the analysis of problems in the framework of human relations (Estrada, 2017), are: autonomy, beneficence, nonmaleficence and justice, without a strictly delimited hierarchical establishment, as it is the context and the particularities of each case that determine the

prevalence of one principle over another (Feito, 2011).

Additionally, from a macrobioethics point of view, a trend that allows the consideration of other forms of life in the analysis of these problems (Estrada, 2017), these principles should be rethought, especially when it comes to animal welfare, to allow a better approach to the human-wild animal relationship, due to the particular interests of non-human animals (Estrada, 2021), and that human beings in their condition of moral subject should guarantee. Thus, based on the analysis made by Estrada (2017), it is proposed that the order of principles from macrobioethics should be: justice, beneficence, non-maleficence, and autonomy transformed into heteronomy.

Ecopedagogy, on the other hand, as an alternative approach to environmental education, and which Zimmerman (2005), associates as the art of teaching about the habitat of the planet's living beings, emerges as a complement to contribute to environmental education processes through the use of different strategies, guidelines and means to assume the teaching processes and modify the way in which current human social and environmental relations are presented.

Grounded in the principles of the Earth Charter (Carta de la Tierra Internacional, 2000)—a key resource for cultivating critical and transformative educational practices (Ezcurra & Gómez, 2021)—the Charter of Ecopedagogy (Gadotti, 2002) consolidates foundational tenets of ecopedagogical thought. Applied within educational contexts, these principles aim to reshape economic, social, and environmental practices and include: (1) development grounded in justice, equity, and solidarity; (2) ecological awareness integrated into education; (3) sustainability fostered through critical thinking; and (4) the recognition of everyday life as a pedagogical space (Vilches, 2015).

The linking of these two disciplines allows a comprehensive approach to wildlife and the associated teaching processes, taking into account that the first offers criteria that guide the actions of human beings in different areas (García, 2015), and allows raising moral reflections about the human-wildlife relationship; and the second, conceived as a transforming pedagogical reference (Misiaszek, 2015), contributes to the holistic and sustainable understanding of wild species and other elements of the environment and human beings.

Thus, bioethics, from its two currents (micro and macrobioethics), and ecopedagogy, are assumed as theoretical references for the reconfiguration of a curricular perspective that contributes to the consolidation of educational elements focused on wildlife. Hence, the importance of promoting these processes from a critical and transformative stance that overcomes reductionist views of wildlife to move towards a multidimensional approach (Moraes, 2022).

The objective of this research was to formulate curricular principles for teaching wildlife that would enhance students' knowledge, skills, attitudes, and values, while also encouraging reflection on the human-wildlife relationship within school contexts. Given Colombia's diverse ecosystems—ranging from rainforests and mountains to coastlines and savannas—and its rich wildlife, conservation efforts are vital for the country. Despite this, the current educational framework fails to adequately address wildlife conservation and bioethics, creating a significant gap in students' understanding of these crucial issues.

The following question guided our research inquiry:

1. What curricular principles can be formulated, based on ecopedagogy and bioethics, to integrate wildlife education into Colombian school curricula effectively?

## Literature Review

### *Wildlife Education: Current Challenges and Regulatory Gaps in Latin America and Colombia*

Wildlife is considered an essential element in ecosystems due to its ecological importance and its socioeconomic value for human populations. However, the teaching processes associated with wildlife are scarce and are typically focused on biodiversity conservation, which generally encompasses all living organisms without making the distinctions required for wildlife, given its particularities. Therefore, Estrada, Gaviria, and Pacheco (2017), Estrada, Guzmán, and Parra (2019), and Moreno (2019) agree on the need to strengthen the strategies, resources, and mechanisms of environmental education to reduce the anthropogenic threats that wildlife faces globally.

According to Rubiano (2019), research processes aimed at integrating wildlife into educational contexts began in the 1970s, especially in North America, and included “the planning of outdoor activities, resource management, and evaluation of students’ attitudes and values toward wildlife” (p.109). However, such research is very scarce in Latin America despite the importance of wildlife for different regions. In his investigation, Rubiano concludes that educational processes oriented toward wildlife lack pedagogical and didactic foundations, which limits their inclusion in both basic and university curricula to promote knowledge and conservation. He concurs with Garza (2008), regarding the difficulty presented by textbooks due to the absence of content associated with wildlife and their lack of contextualization.

Moreover, biodiversity education is a crucial reference point due to the limited theoretical and investigative developments associated with wildlife teaching. Various discourses emphasize the importance and necessity of integrating biodiversity into educational processes. However, the path is complex, and investigative processes need to advance. Such is the case with environmental education, which, lacking its own pedagogical and didactic bases, has relied on science didactics to guide teaching and learning processes, showing practical shortcomings that can limit ethical, social, and economic analyses and reflections, focusing exclusively on biological and ecological perspectives.

If scientific advances regarding wildlife teaching processes are scarce, the same is true for the regulatory framework in the Colombian case. Colombian educational regulations do not include actions related to wildlife in any of their references, instead they assume a set of processes associated with the protection and conservation of natural resources in general.

However, the Ministry of National Education’s Law 1549 of 2012, “Which strengthens the institutionalization of the national policy of environmental education and its effective incorporation into territorial development”, establishes in its article 8 that School Environmental Projects (PRAE) can address environmental problems related to biodiversity, among other

issues. Additionally, the Law 84 of 1989, establishes in the second article, section b, the need to “Develop educational programs through state media and public and private educational establishments that promote the respect and care of animals”, including wildlife, as this law indicates in the first article’s single paragraph that “The term ‘animal’ generically used in this Statute includes wild, feral, or savage animals and domesticated or domestic animals, whatever the physical environment in which they are found or live, in freedom or captivity”.

Furthermore, although Colombian environmental regulations acknowledge the importance of environmental education in relation to wildlife, their implementation has proven insufficient. For example, Resolution 2064 of 2010 issued by the Ministry of Environment, Housing, and Territorial Development, “Which regulates the measures after preventive apprehension, restitution, or seizure of specimens of wild species of terrestrial and aquatic fauna and flora and dictates other provisions”, stipulates the need for environmental education to raise awareness of the importance of these species. Similarly, the Congress of Colombia’s Law 1333 of 2009, “Which establishes the environmental sanctioning procedure and dictates other provisions”, includes mandatory attendance at environmental education courses as a corrective measure for environmental violations, including those affecting wildlife. Thus, Colombian regulations fall short in addressing elements that facilitate wildlife teaching processes, which are essential to highlight their need and importance.

## Methodology

The research was developed using a qualitative approach and interpretive method, which, according to Denzin and Lincoln (2015), facilitate the collaborative construction of knowledge, leading to the formulation of curricular principles for teaching wildlife. To this end, elements of the PRISMA 2020 method (Page et al., 2021) were employed for a systematic bibliographic review of theoretical elements. Following this, grounded theory references (Vives & Hamui, 2021) were used to define the theoretical aspects, which collectively informed the development of curricular principles as an emerging theory for understanding wildlife education and guiding action in educational institutions in Colombia.

The research involved identifying curricular aspects related to wildlife teaching in the current official normative references. A total of 23 international and national policy documents related to education, environmental education, biodiversity, and wildlife were selected. Using the *Atlas ti* software and content analysis, the relevant curricular aspects for wildlife education were identified. The categories used to configure the curricular principles are based on elements specific to school curricula and emerged from the theoretical review and the findings of this research. These categories include: conception of wildlife, purpose of teaching wildlife, forms of incorporation, teaching content, teaching resources, and evaluation processes.

Given that the research did not involve the use of live specimens, there was no need to obtain permissions or endorsements from an ethics or bioethics committee.

## Results and Discussion

The definition of curricular principles for teaching wildlife in school contexts is guided

by the integration of those proposed for bioethics by Beauchamp and Childress (1971), and Estrada (2017), and for ecopedagogy by Gadotti (2002), (see Tables 1 and 2), and are applicable and flexible to adapt to different levels of training and educational contexts. Their organization is determined by the curricular categories used for the research, which were: conception of wildlife, purpose of wildlife teaching, incorporation of wildlife teaching, teaching content, teaching resources, and evaluative processes.

**Table 1.** *Principles of bioethics*

	<b>Principles</b>	<b>Description</b>
<i>Beauchamp &amp; Childress, (1979)</i>	<i>Non-maleficence</i>	<i>not to do evil or harm.</i>
	<i>Beneficence</i>	<i>To carry out ethically correct actions that involve a good for the other equal to me.</i>
	<i>Justice</i>	<i>Guaranteeing equal opportunities for all, all understood as equals.</i>
	<i>Autonomy</i>	<i>Capacity to make one's own free and planned decisions.</i>
<i>Estrada, (2017) (macrobioethics)</i>	<i>Justice</i>	<i>Respect for the particular interests of animals, different from humans and each other.</i>
	<i>Beneficence</i>	<i>Ethical action on the other components of the environment, seeking in all cases to do good.</i>
	<i>Non-maleficence</i>	<i>Avoidance of harm to components of the environment.</i>
	<i>Heteronomy</i>	<i>Understanding of animal behavior that does not affect their welfare, for which it must be detached from human rationality.</i>

Source: own elaboration.

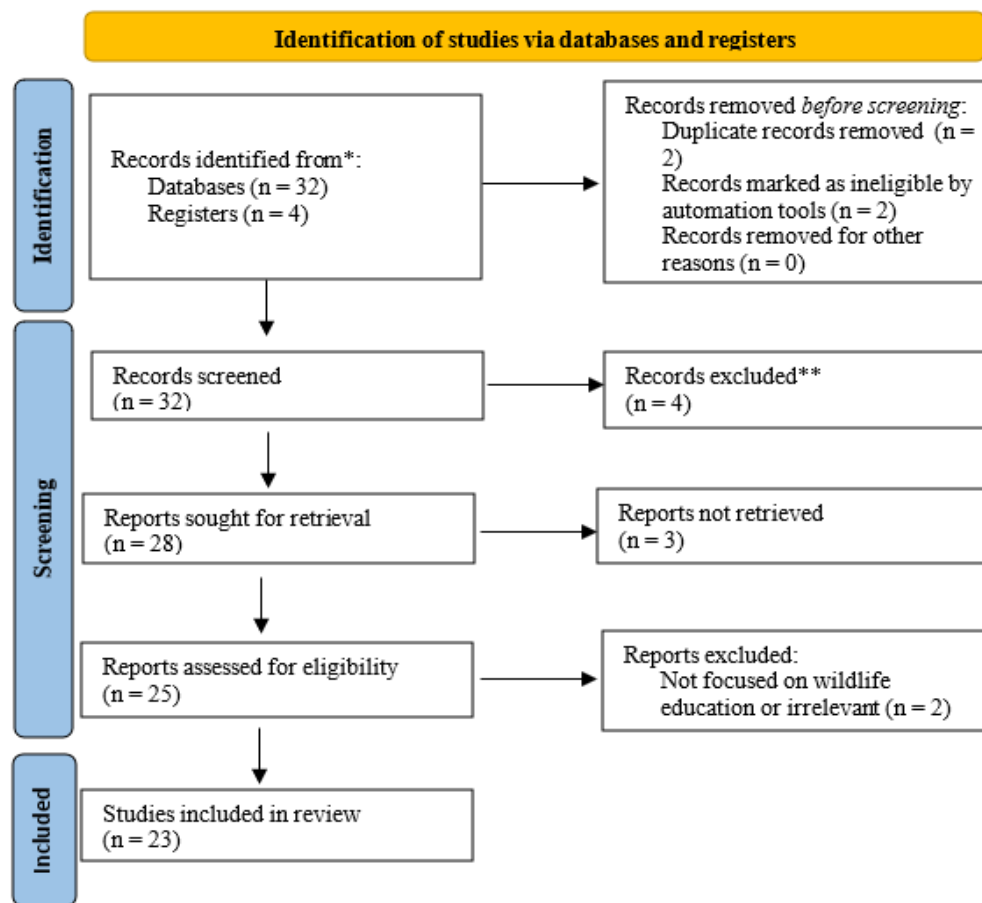
**Table 2.** *Principles of ecopedagogy*

	<b>Principles</b>	<b>Description</b>
<i>Gadotti (2002)</i>	<i>Planet Earth as a living organism</i>	<i>Recognition of consciousness towards the living beings that coexist on the planet.</i>
	<i>Development with justice, equity and solidarity</i>	<i>Change to the economic paradigm that implies being economically feasible, ecologically appropriate, socially just and culturally equitable.</i>
	<i>Ecological awareness linked to education</i>	<i>Ecotraining as a mechanism to recover environmental awareness.</i>
	<i>Sustainable education based on critical thinking</i>	<i>Building a culture of sustainability for the promotion of meaningful living.</i>
	<i>Everyday life as a learning space</i>	<i>Starting from people's needs and interests for planetary education.</i>
	<i>Reeducating our view of the environment</i>	<i>The need to develop new attitudes in order to educate for planetary citizenship.</i>
	<i>Proposal for governance in education</i>	<i>implies democratic management, autonomy, participation, ethics and cultural diversity.</i>

Source: own elaboration.

The PRISMA 2020 framework ensured transparency and completeness in reporting the selection process of studies included in the systematic review, thereby enhancing the reliability and reproducibility of the findings. Initially, a comprehensive search was conducted across different databases, yielding a total of 32 records. Additionally, four registers were identified and incorporated into the review process. Following a thorough screening, 25 reports were assessed for eligibility based on predefined inclusion and exclusion criteria. After careful evaluation, 23 studies were found suitable and included in the final review. This revision process ensured that the included studies were relevant and of high quality, providing a robust foundation for formulating the curricular principles for wildlife education based on ecopedagogy and bioethics (See Figure 1).

**Figure 1.** PRISMA Flow diagram of the national and international official regulatory documents investigated



Source: own elaboration based on PRISMA 2020 framework.

After a thorough examination of the eligible documents, we proposed a set of curricular principles for wildlife education designed to cultivate citizens dedicated to wildlife conservation, ecosystem protection, and human well-being. These principles aim to foster a commitment to a more just and sustainable future for all living beings, as detailed in Table 3.

**Table 3.** *Curricular Principles for Wildlife Education in Colombia*

	<b>Principles of Bioethics</b>	<b>Principles of Ecopedagogy</b>	<b>Curricular Principles</b>
<i>Concept of Wildlife</i>	<i>Heteronomy (macro-bioethics)</i>	<i>Living and evolving organism</i>	<i>The other animal, independent and coexisting</i>
	<i>Justice</i>	<i>Development with justice, equity, and solidarity</i>	
<i>Purpose of Wildlife Education</i>	<i>Beneficence and Non-Maleficence (Microbioethics)</i>	<i>Sustainable education based on critical thinking</i>	<i>Planetary Sustainability</i>
		<i>Re-educate the perspective on the environment</i>	
<i>Incorporation of Wildlife Education into Curricula</i>	<i>Autonomy (microbioethics)</i>	<i>Everyday life as a learning space</i>	<i>Holism and contextual appropriation of wildlife</i>
		<i>Proposal for governance in education</i>	
<i>Teaching Content</i>	<i>Justice (microbioethics and macrobioethics)</i>	<i>Development with justice, equity, and solidarity</i>	<i>Fair and reflective use of wildlife</i>
		<i>Sustainable education for critical thinking</i>	
<i>Teaching Resources</i>	<i>Justice (microbioethics and macrobioethics)</i>	<i>Everyday life as a learning space</i>	<i>Multidimensional and present day wildlife</i>
<i>Evaluative Processes</i>	<i>All principles</i>	<i>All principles</i>	<i>Synergy</i>

Source: own elaboration.

### **Curricular principles for wildlife design**

Although in the national context normatively there is evidence of the existence of the consideration of wildlife sentence and the possibility of its sustainable use, as indicated in the Decree Law 2811/1974 of the Presidency of the Republic and its compiling reference Decree 1076/2015, Laws 84/1989, 611/2000 and 1774/2016, a direct association has not been developed with the educational established in Laws 115/1994 and 1549/2012, nor the Curricular Guidelines and Standards, among others. Such norms are constituted as the bases for the construction and updating of the curricula of educational institutions, and continue consequently, with

the perpetuation of gaps in their conception and possibilities of use. This disconnect persists despite the fact that, as early as 1989, Law 84 explicitly established in Article 2, paragraph (d), the objective of developing “educational programs through State media and official and private educational establishments, which promote respect and care for animals”.

In the curricula, the concept of wildlife should be approached from the principle of heteronomy proposed for macrobioethics. This principle calls for human actions to be guided by an understanding of the intrinsic behaviors of animals, with the aim of preventing harm. It emphasizes avoiding anthropomorphization and instead promotes the recognition and necessary development of their naturalness, which is directly linked to the principle of justice from the respect to their own and singular interests, which in a complementary way with the principles of Planet Earth as a living organism and of Development with justice, equity and solidarity of ecopedagogy. Together, these frameworks promote the recognition of all living beings as constituents of planet Earth, independent among themselves but co-dependent within the natural contexts.

The integration of the above principles invites the recognition of wild animals as living, sentient organisms with particular interests according to their nature, fundamental constituents of natural and anthropic ecosystems, which implies the possibility of using them, with the duty to ensure the welfare conditions necessary for their present and future existence. This identification has effects on the sustainable use of wild species to satisfy human needs, such as food, but also the obligation of human beings, as possessors of morality, to avoid any unjustified damage or suffering.

The synthesis of the above is encompassed in the principle of The other animal, independent and coexistent, which seeks the understanding of the human being as a member of the class Animalia (animal), but superior to them for their ethical capacity, which can take advantage of non-human animals for their own justified benefit, recognizing in any case their particularities and own interests. Thus, the integration of these principles aims to generate a school curriculum that pursues and respects the aforementioned elements to promote the development of the integrity of wildlife from ecosystemic, social, economic, and ethical aspects.

### ***Curricular principles guiding the purpose of wildlife education***

In coherence with the limitations identified in the conception of wildlife, the purpose of its teaching has been approached from the ecosystemic and conservationist perspective that has traditionally been included in environmental education policies, which has hindered the approach to its sustainable bioethical use. An example is the provisions of the Millennium Declaration (ONU, 2000) and the Johannesburg Declaration (ONU, 2002), at the international level; in the national context such as Law 115 of 1994, the National Environmental Education Policy (Ministerio del Medio Ambiente and Ministerio de Educación Nacional, 2002), the Curricular Guidelines, among others.

These limitations also manifest in educators' discourse, where the lack of clarity in articulating pedagogical intent reflects an incomplete understanding of wildlife's integrative conception. Moving beyond the dominant conservationist lens—which has shaped both the

perception of wildlife and the ecosystem as inherently altruistic and protectionist—requires a paradigmatic shift in teaching approaches. This reconfiguration should promote the understanding, acceptance, and implementation of wildlife's rational and sustainable use in order to guarantee and improve the quality of life of human beings.

Once the concept of wildlife and its gaps are clearly addressed, directly related to the purpose of teaching, the necessary incorporation of the bioethical principles of Beneficence and Non-maleficence is presented. The use and exploitation of this animal group should be sought through the development of ethical actions to avoid any unjustified damage, where greater goods are always guaranteed. These principles should be complemented by the ecopedagogical foundations of sustainable education, which emphasize critical thinking and the re-education of environmental perspectives. From this integrated approach, animals are recognized not only for their ecological role in maintaining the conditions necessary for life on Earth but also for their importance in meeting the diverse needs of the human communities with whom they coexist. This dual recognition strengthens a more responsible and ethically grounded relationship with wildlife, both within and beyond ecosystem boundaries.

Considering the need for the bioethical use of wildlife implies that its use should be sustainable, generating the least possible damage, and taking into account the moral reflection involved in admitting that they may experience pain, suffering or pleasure, and therefore, feelings must also be taken into account in each of the decisions and actions adopted for their use. To this end, it is essential to integrate the critical thinking proposed by ecopedagogy to promote actions that foster a deep understanding of the interdependence between humans and wildlife, promoting the adoption of empathetic and reflective practices that avoid any unjustified direct or indirect affectation, in addition to facing current and future environmental challenges.

From the above, the integrating principle of Planetary Sustainability is generated, which aims to promote educational processes that consolidate a culture of sustainability towards the use of wildlife with effective linkage of the ecosystemic, cultural, economic, social, and ethical fields. These elements are crucial for addressing current planetary conditions, particularly in the Colombian Amazon. Due to its distinctive attributes, this region demands a reorientation of wildlife education, one that significantly influences the health of both natural ecosystems and human-constructed environments.

### ***Curricular principles for the incorporation of wildlife education***

Despite the enunciation in international and national normative documents of the need to incorporate the processes of teaching wildlife from an interdisciplinary approach (UNESCO, 1975; Ministerio del Medio Ambiente and Ministerio de Educación Nacional, 2002), to a transdisciplinary one (Law 1549/12), and the use of contextualized and diverse strategies (Decree 1743/94 and Law 115/94), the challenge of implementing these principles in institutional curricula and teaching discourse remains apparent. This difficulty is mainly due to shortcomings in the conceptual framework and a narrow perspective on the objectives of wildlife education.

For the assertive inclusion of wildlife in school curricula, it is essential to incorporate the principle of Autonomy from microbioethics, understood as the teacher's capacity to make informed and context-sensitive decisions. This autonomy allows educators to adapt pedagogical approaches to the specific regional and institutional realities in which they work. In alignment with the ecopedagogical principles of Everyday Life as a Learning Space and Governance in Education, this perspective promotes the integration of methodologies and strategies that are responsive to local contexts. Such an approach supports the development of a flexible and transdisciplinary curriculum, capable of meaningfully addressing the complexity of wildlife education and fostering deeper connections between students, their environment, and their communities.

The incorporation of wildlife in educational institutions must start from the recognition of contextual particularities. For this, teachers must have elements that allow them not only to identify them, but also to act autonomously to generate appropriate teaching strategies. In this sense, the integration of knowledge and methodologies from various disciplines is required to address the complexity involved in teaching wildlife, considering the integrality of its conception, as discussed above.

Therefore, the principle of holism and the contextual appropriation of wildlife are proposed to advance the integration of wildlife education. This needs the development of transdisciplinary curricula that, guided by holistic thinking, encourage understanding phenomena as interconnected wholes rather than isolated components. In the case of this research, the aim is to integrate disciplines, methods, and strategies to achieve integral educational processes that avoid fragmentation and decontextualization of knowledge associated with wildlife and other related environmental elements.

### ***Curricular principles for defining teaching content***

The prevalence of conceptual content (knowledge) over procedural content (skills and actions) and attitudinal content (values), both in institutional documents and in teachers' discourse, despite what is established in different international normative references such as those of the ONU (1982), and national ones such as those of the Ministerio de Educación Nacional (1998; 2002), shows the desperate need for the consolidation of an integrated approach to school curricula and therefore to the concept of wildlife.

For the delimitation and articulation of the different types of teaching contents, it is necessary to start from the bioethical principle of Justice, from its macro and microbioethical perspective, relating respect for animals from an equal consideration of both their particular interests and those of the human populations that cohabit, and that in many cases depend on them. Considering in equal measure the interests of wild animals does not imply, from any point of view, a proposal of equal treatment but, precisely, a particularized one, in order to promote their rational, sustainable, and compassionate use.

For this purpose, the bioethical principle developed above must be coherently integrated with the principles of Development with justice, equity, and solidarity, and Sustainable education for critical thinking proposed by ecopedagogy. These principles consider the need

to promote development from sustainability, which implies the connection between economic, ecological, social, and cultural aspects.

The assertive linking of these principles also allows the articulation of contents that promote conceptual, procedural, and attitudinal aspects through the fair use for both wildlife and human beings. The development of specific knowledge about wildlife allows a better understanding of its biological, ecosystemic, sociocultural, and economic importance for human populations. The procedural contents are essential in view of the need to develop concrete skills for its protection and use, considering the multiple possibilities of becoming a sustainable economic source in highly biodiverse regions with productive potential, such as the Colombian Amazon. Attitudinal skills are necessary for the development of critical thinking that will lead to reflections on the relationship between human beings, wildlife, and other elements of the environment.

It is for this reason that the principle of fair and reflective use of wildlife is proposed to guide the definition of the contents of wildlife education. This principle seeks to promote equity, solidarity, and sustainability, in consideration of the importance of this animal group for human beings in terms of its uses, in addition to the necessary valuation of its participation in the maintenance of ecosystems, and therefore, of life on the planet.

### ***Curricular principles guiding the selection of teaching resources***

Both in the teaching discourse and in institutional documents, there is evidence of the prioritization of textbooks and guided readings for teaching wildlife, despite the importance indicated by UNESCO (1977), and ONU (1992), documents at the international level and Law 115/94, Decree 1743/94 and the Curricular Guidelines of the Ministry of Education (Ministerio de Educación Nacional, 1998; Ministerio de Educación Nacional, 2002) at the national level, on the use of different educational tools that can be adapted to particular and contextual conditions.

The necessary linkage of the principle of “justice” from micro and macrobioethics, understood from the equality in access to training associated with wildlife, as sentient beings different from humans, which together with the principle of “everyday life” as a learning space of ecopedagogy, are the pillars for the selection of teaching resources in order to ensure fair, equitable and contextualized educational processes so that students can access in a relevant and varied way to knowledge associated with wildlife.

The union of these principles seeks the implementation of diverse resources that promote comprehensive teaching processes of wildlife, in consideration of its integral conception, in which multiple associated concepts converge, which requires a wide variety of tools for its approach. Inclusion and equality by recognizing and valuing the different forms of knowledge and experiences that students have, whether in regions of high contact with wildlife such as the Colombian Amazon, or in others with less contact, leads to the valuation of cultural, social and environmental contexts, and therefore should be a fundamental part of the definition and selection of the resources to be used.

This makes it possible to propose the principle of multidimensional and present-day wildlife,

which aims to recognize that, given the integrality of the concept of wildlife, its approach in terms of teaching resources must consider the multiple dimensions that compose it through the diversity of tools and the variety of everyday spaces and particular contexts of educational institutions. These contexts shape educational settings, wherein teachers and students actively contribute to ensuring the relevance and meaningfulness of the learning process.

### ***Curricular principles to guide the evaluation process***

As established by PNUMA (1997), at the international level, and by Law 115/94 and the Curricular Guidelines issued by the Ministry of Education (Ministerio de Educación Nacional, 1998; Ministerio de Educación Nacional, 2002), at the national level, evaluation processes should provide continuous feedback to students on their performance and help them develop reflective skills. However, the teaching discourse often prioritizes written tests, which, while a valid assessment tool in some contexts, they also need to be complemented with other strategies. To foster creativity, debate, and a deeper understanding of wildlife, it is essential to incorporate diverse evaluation methods that promote knowledge acquisition, conservation awareness, and sustainable use.

Taking into account that evaluation is an essential element in teaching because it allows determining the achievement of the proposed objectives within the educational process, this research proposes the necessary linkage of all the principles of bioethics and ecopedagogy, so that together they promote formative evaluation, understood as a permanent process for the assessment of learning and teaching.

Thus, the curricular principle of “synergy”, which articulates all the principles stated above, refers to their effective interaction to promote formative evaluation. “Synergy”, understood from the action of two or more causes whose effect is greater than the sum of the individual effects (RAE, 2024), seeks the participation of all the principles that, although addressed individually for each of the categories, are interconnected and mutually reinforcing to guide the wildlife teaching process.

Therefore, this curricular principle aims to guide assessment to maximize its effectiveness and quality, allowing for a more complete and accurate understanding of student performance and learning outcomes. In addition, in general terms, it seeks to generate an enriching and stimulating educational environment, where all the principles are effectively linked to achieve the objectives in an effective and meaningful way.

## **Conclusions**

This research does not intend to issue an explicit and immovable guide of curricular principles, but rather, a series of elements that, enriched with bioethics and ecopedagogy, contribute to the inclusion of wildlife in a pertinent, critical and flexible way, according to the particular needs of the educational contexts. The proposed set of curricular principles for wildlife education seeks to develop citizens who are committed to wildlife conservation, ecosystem protection, and human survival, thus promoting a more just and sustainable future for all living beings.

Both bioethics and eco pedagogy must serve as foundational theoretical elements guiding public policy. Consequently, they should be integrated into the doctrinal framework, providing a basis for the development of new laws or the updating of existing ones. This integration is essential to establishing new goals and strategies that incorporate wildlife education into school curricula effectively.

The findings of this study offer valuable insights into integrating wildlife education into school curricula. The proposed curricular principles provide a robust framework for educators and policymakers to design and implement effective wildlife education programs. By incorporating bioethics and ecopedagogy, these principles support the development of curricula that enhance students' understanding of wildlife and its ecological roles, guiding the creation of engaging and relevant educational materials. The study also highlights the need for policies that include wildlife education in national and local curricula, advocating for revisions or new regulations to support this integration. Professional development for educators is essential, equipping them with the tools to teach wildlife conservation effectively and promote critical thinking. Overall, the study lays a solid foundation for advancing wildlife education, fostering a generation of informed and responsible citizens dedicated to biodiversity and ecological sustainability.

The study's reliance on 23 selected international and national policy documents may not encompass all relevant regulatory perspectives or recent developments. This limitation could affect the comprehensiveness of the curricular principles proposed. The findings are primarily based on the educational context of Colombia, which may limit the applicability of the curricular principles to other regions with different environmental and educational challenges.

Future research could be extended to other geographical contexts to explore how different environmental and cultural factors influence wildlife education. Additionally, comparative studies could help adapt the principles to various educational settings. Moreover, conducting empirical studies to test the effectiveness of the proposed curricular principles in real classroom settings would provide valuable insights into their practical application and impact on student learning outcomes.

## Final statements

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