

## Worldview and Conservation: Crocodiles and Caimans in the Pijao Indigenous People in Colombia

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**Abstract** Sacred and cultural practices that link biodiversity with Indigenous communities play a vital role in conservation. Likewise, fauna associated with these practices have positive implications for many species with which they share their ecosystems. Recognizing how cultural worldviews shape, and are shaped by, the physical characteristics of a territory can strengthen conservation and restoration efforts. However, in the case of the Pijao people, an Indigenous group from Colombia, socioeconomic and landscape transformations have deeply affected cultural practices and identity, putting at risk both ancestral knowledge and the species that benefit from it. We report on the connection between the Pijao people with two species of crocodylians (*Crocodylus acutus* and *Caiman crocodilus*) as well as the role these animals play within their worldview and ancestral medicine. Our study offers new contributions to the cultural and spiritual role of crocodylians in Colombia. It highlights the importance of strengthening Indigenous knowledge and identity to maintain customs and traditions, as preserving these ancestral practices is essential for the continuity of ethnic identity and the protection of these species as a unique expression of cultural heritage.

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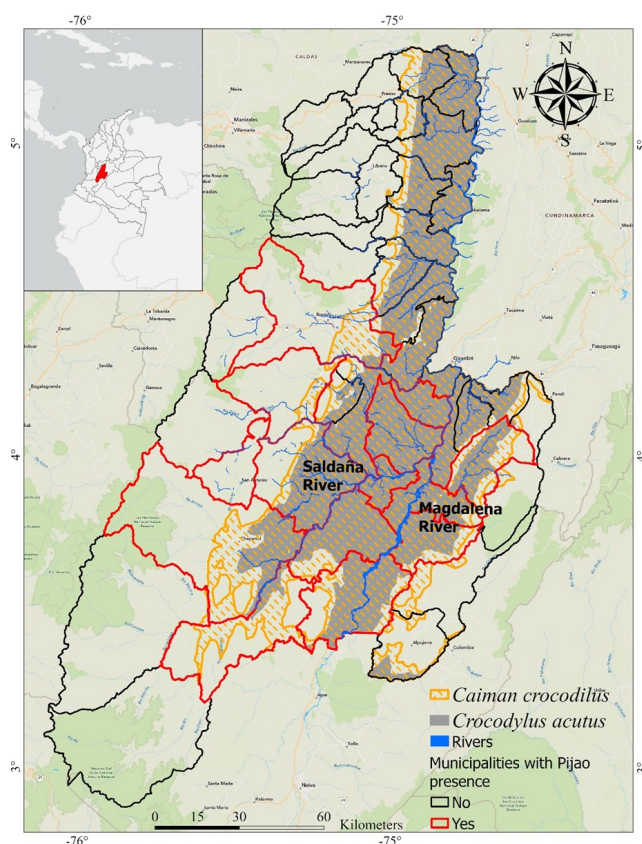
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### Introduction

Biocultural practices, those that are both spiritual and cultural, are deeply embedded in the ways Indigenous Peoples interact with their territories. These practices are part of an integrated worldview where biodiversity is not only a source of material resources but also a repository of meaning, identity, and responsibility (Maffi and Woodley 2010; Ruheza and Kilugwe 2012; Verschuuren 2007). Similarly, fauna linked to Indigenous spiritual and magical attributes can have a positive influence on the conservation of multiple species within shared ecosystems (Holmes et al. 2018). Therefore, understanding the physical and symbolic dimensions of a territory through the lived experiences and knowledge systems of the Indigenous Peoples who inhabit it is essential for effective

conservation, protection, and restoration efforts (Gavin et al. 2018; Infiel and Mugisha 2010; Kohler et al. 2019).

Wildlife is not only valued for its material uses, such as food, medicine, or raw materials, but also appreciated for the cultural meanings and emotional connections it inspires, which in turn fosters respect, pride, and protection toward nature (Pretty et al. 2009). For instance, in the Argentine Dry Chaco, animals like the puma or the caiman are not only hunted for food or medicinal purposes but are also seen as spiritual beings with symbolic significance who guide behavior and reinforce cultural identity (Camino et al. 2018). Similarly, among the Nahua communities of Puebla, Mexico, reptiles and amphibians are deeply embedded in moral, medicinal,



**Figure 1** Map of the distribution of municipalities with the presence of Pijao Indigenous communities and both crocodylians (*Caiman crocodilus* and *Crocodylus acutus*) in the department of Tolima, Colombia.

and spiritual frameworks. They are used in healing practices, symbolically associated with deities, and perceived as regulators of human behavior (Linares-Rosas et al. 2021). This is particularly prevalent among Indigenous Peoples, where the land and its components hold a sacred and central role within their ethnic identities, prompting local actions for its protection (Toledo 2001). This highlights the crucial role that ancestral peoples play in conservation processes (Berkes et al. 1994), since their territories are home to ecosystems that contain high biodiversity (Dawson et al. 2021; Garnett et al. 2018; O'Bryan et al. 2021).

However, the significance of Indigenous Peoples' traditional ways of life is being compromised by globalization, modernization, and changes in socio-economic contexts (Aswani et al. 2018). This results in a disconnection from their own cultures and contributes to linguistic loss and the diminishing of Indigenous knowledge (Figuerola 2011; Loh and

Harmon 2014). Moreover, transformations and inadequate management of their territories can lead to the modification or disappearance of cultural expressions, creating gaps between native communities and their past (Antrop 2005).

Illustrating this in Colombia is the Pijao ethnic group, also historically referred to as Pixaos, Pyjaos, or Pinaos, originally semi-nomadic hunter-gatherers whose early subsistence practices are reported to have included anthropophagy (Salmoral 1963). The Pijao were later pressured to adopt an extractivist model, resulting in significant spatial transformations and a rupture from their traditions. This change was marked by persecution during colonization, followed by dispossession and abandonment by authorities in subsequent years, leading to a considerable decline in population and territorial shrinkage (Ministerio del Interior 2014). The Pijao language is currently considered extinct (Zwisler 2018). By 2018, its population was 51,635 people (DANE 2018), and by the following year, their presence was limited to 205 communities and 114 Indigenous reserves, mainly in the department of Tolima (Perdomo 2019; Figure 1).

This Indigenous group maintains a close relationship with nature, which plays a central role in shaping their cultural identity and territorial organization (Ortiz Gordillo et al. 2023). Their ancestral lands encompass ecosystems that reflect the representative biodiversity of the Tolima region. Among the species found there, some hold profound symbolic and spiritual significance within the Pijao worldview, which has not been previously documented. These include the needle caiman, American crocodile, or Magdalena crocodile (*Crocodylus acutus*), which is classified as Vulnerable (Rainwater et al. 2022), and the *babilla* (*Caiman crocodilus*), a species not currently considered threatened globally, even as its local conservation status is uncertain (Balaguera-Reina and Velasco 2019). The extent of the spiritual and cultural relationship between the Pijao people and these species remains largely undocumented.

Based on Indigenous research methodologies (Kovach 2009) and informed by the principles of collaborative ethnography (Lassiter 2005), here we report on the cultural and spiritual significance of these two species for the Pijao people. Our approach draws primarily on our own lived experiences as Indigenous representatives of this community, and especially on the ancestral knowledge of two of the

authors, both of whom are traditional healers of the Pijao people. This knowledge was complemented by conversations held between 2022 and 2023 with other members of Pijao Indigenous communities and reservations in southern Tolima.

### The Origin of the World for the Pijao Indigenous People

According to the cosmogony of the Pijao people, the Earth is immersed in a perpetual duality between two forces represented by cold (*Chirí*) and heat (*Chajuá*). This rivalry dates back to when the moon (*Taiba*) desired to retain the water flooding the earth to contemplate its beauty, leading to the designation of *chirí* as the guardian of water. Conversely, the sun (*Ta*) aimed to rest and create the lagoon covering the planet, dispatching *chajuá* on a mission to evaporate it. This event gave rise to Mother Earth (*Bota ima*), resulting in the creation of fauna and flora through fertilization by *Ta*.

Nevertheless, this process initiates conflicts between the spirits of the cold, more closely linked to plants and animals in aquatic or cold environments, and the spirits of heat, with a greater affinity for terrestrial species in warm areas. To restore balance, *Ta* fertilized *bota ima* once more, giving rise to human beings whose primary role was to facilitate harmonious relationships between *chirí* and *chajuá*, seeking equilibrium in their interaction with the environment and surrounding species.

### The Role of the Crocodilians within the Ethnic Group

According to members of the Pijao community, these species fulfill ecological, energetic, and spiritual functions within the ecosystems they inhabit. *Alemao* (*C. acutus*) and *kaxiol* (*C. crocodilus*) represent cold spirits that, along with the ancestral doctors or *mohanes*, regulate, purify, and protect water bodies, ensuring balance for the species inhabiting them. Hence, the presence of these species is crucial for the health and existence of rivers and lagoons.

Regrettably, the health of numerous water bodies has been jeopardized in recent decades due to the local extinction of *Alemao*. Historically, this species was widespread from the Magdalena River, known in Pijao as *Ico Antene Yuma Jizbil Acabuanca*, to several tributaries of the Saldaña River (Pijao: *Antene Melamina*). Overexploitation for skin and fat, coupled with substantial landscape changes in Tolima during the twentieth century, led to population decline. This

had a profound impact on the spiritual harmony of water channels and compromised their overall health. Presently, the distribution range of *C. acutus* within the Pijao territory is confined to a few areas in the Magdalena River in the department of Tolima.

### Uses of Crocodilians

*Alemao* and *kaxiol* served to ward off malevolent forces affecting people. In the past, *mohanes* employed the *matachines* dance (meaning "They don't kill me") using masks crafted from plant materials and suits made from the skin of these reptiles to invoke different spirits. These spirits, through fear, aided in dispelling evils afflicting a person. Also, they used the fangs and claws as good fortune amulets. Warriors selected for capturing these reptiles during full moon nights (*Taliban*) underwent a ritual where the chief utilized fat from the sacrificed animals to anoint the new warriors.

Within the ancestral medicine of the Pijao people, the cold spiritual nature of *C. acutus* and *C. crocodilus* allowed them to be employed in treating various ailments, such as diabetes and cancer. The fat from these animals was used for injuries, burns, and respiratory problems. However, the medical application of these species depended on the type of ailment and the patient's location. Diseases caused by heat spirits could be neutralized with medicines derived from cold spirits, and vice versa. Treating an illness with the same type of spirit that caused it could exacerbate the patient's condition.

According to the oral tradition of the ethnic group, during the Spanish colonization era, many *mohanes* were persecuted and punished for their beliefs. Some sought refuge in specific places like forests, caves, rivers, and lagoons, assuming the guise of animals such as foxes, sloths, howler monkeys, fish, and caimans. This strategy continues to be embraced by some *mohanes* today to protect the territory and accompany the Pijao people.

### Conservation and Conflicts

Within Indigenous reservations, hunting of *C. crocodilus* for commercial purposes or human consumption is prohibited by Indigenous authorities. Its use is restricted only for medical purposes, with the ancestral doctor being the only one authorized to allow the sacrifice of an animal for the purpose of carrying out specific treatments, as long as the patient has previously performed the necessary spiritual attunement.



As a result of protective measures implemented by Indigenous authorities, the *kaxiol* populations within Pijao territories have remained relatively robust. However, individuals of this species outside these territories face significant pressures, primarily due to hunting for consumption or trade. These activities often give rise to conflicts between Indigenous and non-Indigenous communities. In the case of *C. acutus*, the observation of individuals is sporadic due to its low population density. For this reason, the use of this species for human consumption, commercial, or medical purposes was strictly prohibited by Indigenous authorities.

### Discussion

Crocodylians evoke a wide range of emotions and perceptions within communities. While these animals often inspire fear, they can also be viewed with respect, curiosity, and even admiration (Janovcová et al. 2019; Neves and Giger 2023). This would explain the reason that they have historically been linked to cultural, spiritual, and aesthetic values in various societies (Olupona 1993; Passariello 1999; Stephens

2005; Telban 2008). Recognizing the symbolic and relational meanings attributed to wildlife, particularly those species that evoke fear, conflict, or tension, can help contextualize the dynamics between humans and animals (Pooley et al. 2017). Such knowledge supports more inclusive and culturally grounded strategies for coexistence, especially in cases of perceived conflict (König et al. 2021; Pooley et al. 2021a). This approach could be particularly beneficial in the case of *C. acutus* and *C. crocodilus*, which rank first and fourth, respectively, in terms of the highest number of negative interactions among crocodilian species in Latin America (Pooley et al. 2021b). In Colombia, although there are significant gaps in knowledge regarding crocodilian populations, biology, and local perceptions, evidence indicates that these animals have played key roles in cultural, medicinal, and ethnic practices across various groups (Morales-Betancourt et al. 2013). However, considering the country's cultural diversity (Ministerio de Cultura de Colombia 2022; Wade 2004), the roles crocodilians and other taxonomic groups occupy within Indigenous worldviews remain largely undocumented (Hernández

**Table 1** Cultural importance of *Crocodylus acutus* and *Caiman crocodilus* in Colombia.

| Species                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | References                                                                                                                                      |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Caiman crocodilus</i> | Among the Nukak people of Guaviare, caimans are believed to embody ancestral beings who transformed into caimans during a great flood. For this reason, they are thought to inhabit the animal house of the floodplain, linking them to both mythological origins and the natural world.<br>In communities along the Colombian Pacific, parts of this species are occasionally used. The skull and teeth are used as ornaments, while the skin is crafted into artisanal products.<br>In the Caribbean region and the Magdalena River basin, the fat of the American crocodile is traditionally believed to have healing properties. It is used to treat asthma and other respiratory conditions.                                                                                                                                                                                                                                   | Politis and Saunders 2002<br><br>González and Aspílla 2009; Usma-Oviedo et al. 2009<br>Morales-Betancourt et al. 2013                           |
| <i>Crocodylus acutus</i> | Initially, this species was linked to Indigenous rituals in which the caiman was considered a sacred being and spiritual mediator. Over time, the legend evolved through <i>mestizaje</i> (the blending of Indigenous, European, and Afro-descendant traditions), becoming a festive and critical folkloric expression.<br>In La Guajira, the bones of the American crocodile (especially the skull) are used to heal wounds and sores. The bone is crushed into a fine powder and applied directly to the wound to promote rapid healing.<br>This species is reflected in various pre-Hispanic ornaments, such as pendants, necklaces, chest pieces, nose rings, and pots, crafted from materials like gold, copper, clay, wood, bone, and stone.<br>The Wayuu myth of Keeralia describes a crocodile spirit from La Guajira that seduces women at sunset, causing them to explode and give birth to snakes, iguanas, and lizards. | Mendoza Roldán and Gómez 2025; Ramírez 2015<br><br>Corpoguajira and Asociación Desarrollo Guajiro 2006<br>Ulloa-Delgado 1996<br><br>Turbay 1994 |

-Coronado 2018; Janssen et al. 2024; Morales-Betancourt et al. 2013).

At the cultural level (Table 1), various folkloric representations and popular legends involving *C. acutus* have previously been documented in Colombia (Morales-Betancourt et al. 2013; Turbay 1994). Particularly in the Caribbean region, this species has been recognized as culturally significant to human societies since the Archaic Period (ca. 3300 BCE), profoundly shaping regional identity through traditional dances, popular festivals, commemorative monuments, and musical expressions (Mendoza Roldán and Gómez 2025). Similarly, as reported in the present study, the species has been attributed with curative powers, especially in the treatment of respiratory conditions and other diseases (Corpogujira y Asociación Desarrollo Guajiro 2006; Morales-Betancourt et al. 2013). Nonetheless, none of the previous accounts mentioned the role of *C. acutus* as a spiritual guardian, as revealed in this work. These findings highlight the need to broaden the understanding of this species, recognizing its deep cultural, medicinal, and spiritual significance for local and Indigenous communities.

A similar situation applies to *C. crocodilus*. In Brazil, Ecuador, and Venezuela, this species has been documented in rituals intended to ward off evil spirits and offer protection against witchcraft (Alves et al. 2012; Corr 2023; Seijas 2011). In Colombia, references to this species have primarily focused on its use in the creation of ornaments and handicrafts (González and Asprilla 2009; Usma-Oviedo et al. 2009). Additionally, in the department of Guaviare, the Nukak communities consider that this species represents specific ancestors who took the form of a caiman during a great flood (Politis and Saunders 2002). However, no reports have documented spiritual functions attributed to *C. crocodilus* among other local communities (Morales-Betancourt et al. 2013).

Throughout the American continent, the image of crocodylians has profoundly influenced the worldviews of various cultures, in which these reptiles are considered sacred due to their association with the creation of the world and the spiritual role attributed to them as guardians (Bassie-Sweet 2008; Salt 2005; Taube 1989; Velásquez García 2006). In South America, species such as *Paleosuchus palpebrosus*, *Paleosuchus trigonatus*, *Melanosuchus niger*, *Caiman latirostris*, and *C. crocodilus* have been documented as

being used for magical and religious purposes (e.g., protection against negative energies and as good luck charms), as well as for treating ailments, such as rheumatism, vascular accidents, snakebites, and respiratory illnesses (Alves et al. 2007, 2012; Alves and Rosa 2010; Castellanos et al. 2005; Costa-Neto 2005). Additionally, the fat of *P. palpebrosus*, *P. trigonatus*, and *C. crocodilus* is known to be used to enhance ancestral medicinal practices and rituals (Pagani et al. 2017).

This similarity in uses may be related to the concept of therapeutic redundancy: the use of multiple animal species to treat the same ailment, which serves as a resilience strategy in contexts where specific faunal resources are scarce or unavailable (Castillo and Ladio 2019). However, to clarify this possible relationship, more detailed studies are needed, particularly considering that Costa-Neto (2005) refers to unpublished data from another researcher in Peru, reporting that some communities use caiman blood to treat epilepsy and cerebrovascular accidents. This suggests that some ethnobiological knowledge remains unpublished. The variation in how data are collected highlights the urgent need to standardize research methodologies in this field, to improve cross-study comparisons and achieve greater clarity in the analysis of usage patterns (Gutiérrez-Santillán et al. 2018).

In this study, we generated new contributions regarding the cultural and spiritual role that the species *C. acutus* and *C. crocodilus* present in Colombia. Likewise, this study expands knowledge regarding the Pijao ethnic group and its worldview. Also, it reports the relevant role that the different Indigenous reservations are playing concerning the conservation of *C. crocodilus* and *C. acutus*. This form of conservation could be understood as a “diverse conservation” (Gillette et al. 2023), as it is not carried out through formalized interventions but rather through indirect actions shaped by the ontological and spiritual responsibility that we, as Pijao people, feel toward the rivers, lagoons, and the beings that inhabit them. This includes these two reptile species. This insight highlights the unique contribution of the present study in documenting the cultural role of *C. acutus* and *C. crocodilus*, underscoring the cultural and spiritual dimensions that have been overlooked in previous accounts, and opening new avenues for integrating cultural perspectives into conservation efforts.

The Pijao people hold significant potential to

contribute to the conservation of these species. However, it is essential to implement projects and initiatives aimed at revitalizing Indigenous knowledge and strengthening cultural identity to ensure the preservation of their customs. The Pijao have faced a persistent struggle for the recognition of their rights and identity within their ancestral territory, a battle shaped by historical land dispossession, processes of acculturation, limited institutional and governmental presence in their territories, and patterns of violence and exclusion (Roldán Zarazo 2016). Studies have shown that younger generations are experiencing a decline in ancestral knowledge (Mendoza Hernandez et al. 2021). This issue is compounded by the extinct status of the Pijao language (Zwisler 2018), with only a few native speakers remaining, highlighting the urgent need for cultural and linguistic preservation efforts.

The potential loss of *C. acutus* and *C. crocodilus* species within Pijao territory is not only an ecological concern but a cultural one, as it threatens the erosion of ancestral knowledge, spiritual relationships, and language linked to them. In this sense, the conservation of these crocodilians becomes inseparable from the revitalization of Pijao identity, worldview, and territorial sovereignty. This is because biodiversity, traditional ecological knowledge, languages, and Indigenous territories are deeply interdependent (Maffi and Dilts 2014; Maffi and Woodley 2010). Furthermore, the disruption of local communities' connections with their territories, whether through imposition or cultural assimilation, has negative effects on crocodilian populations and their habitats, which were historically protected through local spiritual taboos and customary norms (Bio Ouré et al. 2023; Pooley 2016).

Interactions deeply rooted in spiritual values have been pivotal in advancing conservation efforts (Berkes 2009; Garnett et al. 2018; van der Ploeg et al. 2011). Preserving these traditions and ancestral knowledge is essential to maintaining the ethnic identity of the Pijao people, ensuring the protection of crocodilians through the unique cultural heritage these communities embody. Additionally, Indigenous, peasant, and other local Colombian communities can play a vital role in monitoring wild crocodilian populations (Gómez-González et al. 2017; Ulloa-Delgado 2005). To support these efforts, it is crucial to promote ethnozoological studies that explore the relationships between communities and these reptiles,

enabling the development of effective conservation strategies tailored to their cultural and ecological contexts. This is especially important, as previous studies have shown that local ecological knowledge and community-based social organization around crocodilian species can foster the emergence of management practices that, in turn, help ensure the persistence of the species while supporting local livelihoods (Bio Ouré et al. 2023; Pooley 2016; Zamudio et al. 2013).

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### Declarations

*Permissions:* We state that the different Indigenous colleagues were informed about the purpose of the data collection and gave their approval for its use.

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