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Rooted in the Mangrove Landscape: Children and their Ethnoichthyological Knowledge as Sentinels for Biodiversity Loss in Northern Guinea-Bissau

Pieter-Jan Keleman[1]*, Rui M. Sá[2], and Marina P. Temudo[1]

[1]Forest Research Center and Associate Laboratory TERRA, School of Agriculture, University of Lisbon, Lisbon, Portugal.
[2]Center for Public Administration & Public Policies, School of Social and Political Sciences, University of Lisbon, Lisbon, Portugal.

*pieterjankeleman@gmail.com

Abstract Biomonitoring fish species losses in data-deficient estuaries of West Africa can be facilitated by consulting small-scale fishermen as on-the-spot sentinels. Children are often prominent fishing actors in rural societies, but scientific studies looking at their ethnoichthyological knowledge are lacking. This study examines childhood fish knowledge inside a Diola village in Northern Guinea-Bissau, discussing how gendered division of labor affects the distribution of such knowledge. By using a photo-based identification methodology supplemented with participant observation and key informant interviews, we compare differences in children's knowledge, perceptions of their mangrove environment, and associated fish diversity. The results show: a) a high level of ethnoichthyological knowledge among the children; b) girls identified fewer fish species than boys; c) both boys and girls show difficulties in correctly naming the fish less visible in the local mangrove ecosystem. We highlight the importance of children's participation in landscape use and maintenance for their cognitive development. Additionally, we conclude that the assessment of children's endogenous knowledge is important for biological conservation, securing fish diversity, and sustainable exploitation efforts in mangrove socio-ecosystems while respecting local bio-cultural identity.

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Introduction

Guinea-Bissau is a small West African republic that holds 2.5% of global mangroves, ranking second in Africa (Giri et al. 2011). Converging ocean currents and regional upwelling events define the xcountry's important marine biodiversity (Campredon and Cuq 2001); its dynamic coastal line represents a network of estuaries hosting mangroves that provide suitable habitats for a flux of both marine and freshwater fish. The intertidal forests thus represent vital shelter and spawning grounds for migrating fish, while their rich aquatic diversity feeds coastal societies and is embedded in local culture (Leeney and Poncelet 2015).

In Guinea-Bissau coastal villages, fish species' availability and people's cultural differences determine the characteristics of the artisanal fishing practices that complement mangrove swamp rice agriculture livelihoods (Temudo and Cabral 2017). Early research on the offshore Bijagos Islands yielded important diversity records (Lafrance 1994), but shoreline estuaries remain underrepresented. Consulting fishers' long-lasting expertise in species and natural resource management can help to overcome this gap (Aswani et al. 2018). Local Ecological Knowledge (LEK) includes locals' fluctuating perceptions and experiences of the immediate environment, resulting from cultural transmission (Bender et al. 2014). LEK

can improve effective biomonitoring and determine socio-environmental conflicts by understanding and integrating local attitudes and species valuations (Mclean et al. 2022). Local people can also act as sentinels tracking biodiversity changes in a data-poor country (Jessen et al. 2022), such as Guinea-Bissau, where governments lack the financial or human resources to conduct comprehensive inventories.

The bio-cultural diversity of natural landscapes determines different LEK distribution patterns among life stages, genders (Pfeiffer and Butz 2005), and regions. Scientists often exclude children when characterizing folk taxonomies within fishing communities toward conservation ends (e.g., Castillo et al. 2018; Djidohokpin et al. 2020). Nonetheless, children's relationships with nature exist (Ross et al. 2002), and ethnobiologists acknowledge their importance within rural societies (Gallois and Reyes-García 2018). Children can be integrated into conservation actions from a young age, cultivating future leadership skills while fostering place attachment and environmental stewardship. This is important as continuous species fluctuations (both introductions and losses) due to socio-ecological changes can influence perceptions and memories of children's immediate surroundings (Turvey et al. 2010). A *Shifting Baseline Syndrome of Fisheries* (Pauly 1995) can thus occur locally with the progressive adaptation to intensified resource depletion (Turvey et al. 2010). A gradual insensitivity to biodiversity changes and an increased tolerance for coastal degradation in children might hinder future conservation efforts.

Ethnographic fieldwork laid the foundation for exploring children's ethnoichthyological knowledge in one Diola (ethnolinguistic group also known as Djola, Jola, or Jóola in Casamance, Senegal) village located in the Mangrove Natural Park of Cacheu (henceforth PNTC) of Northern Guinea-Bissau (Figure 1). This community lives in approximately twenty villages that can roughly be described according to two agroecological and livelihood characteristics: a) coastal villages, where inhabitants produce mangrove swamp rice for consumption, men fish, and women collect oysters for consumption and selling; and b) inland villages, where upland rice, peanuts, root crops, and cashew nuts are produced, men tap palm wine, and women fish for home consumption. For the coastal village-islands, rice is thus the main staple food, and fish represents their only daily source of protein and cash income.

Our main research objective was to explore children's knowledge of fish species linked to mangroves to better understand and anticipate their perceptions of, and potential participation in, sustainable use efforts inside the PNTC. The weakening of traditional belief systems and associated

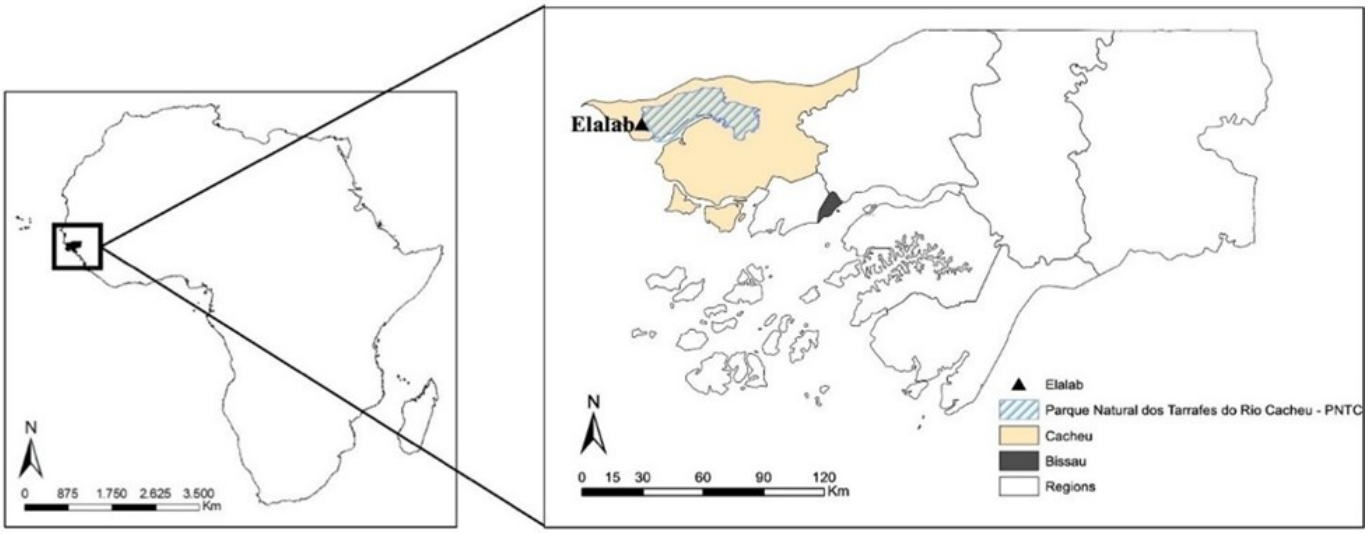

Figure 1 Geographic location of Guinea-Bissau within the African continent (left). Elalab village is located on the outskirts of the Parque Natural dos Tarafes de Cacheu (PNTC) in the Cacheu region, Northern Guinea-Bissau (right). However, the village's surrounding fishing river defines the PNTC's westernmost boundary, locally considered sacred and adopted in state management (IBAP 2008).

sustainable fishing practices mentioned in the PNTC management plan (IBAP 2008) determined our selection of the Diola ethno-linguistic group as a case study. Additionally, the Diola are known for their labor ethos and balanced gender division of work; both boys and girls start to learn domestic, agricultural, and fishing tasks from an early age (Linares 1992). Elalab (one of the coastal villages) was chosen following the observation that: a) boys are important fishing actors and start angling before the age of 10, thus gaining specialized knowledge during early childhood; b) women have progressively abandoned fishing activities since the nineties. This created the conditions for studying gender differences in ethnoichthyological knowledge and exploring a child-inclusive model of biological conservation.

Methods

Study location

Elalab currently consists of approximately 335 permanent inhabitants spread over 70 households (*fogon* in Creole); many urban migrants return to help plow and plant rice during the rainy season, and the population increases to 482. The village is situated at the margins of the PNTC (Figure 1), and its surrounding river is considered sacred in state management (IBAP 2008). The Park area hosts the most continuous mangrove forests of West Africa (Temudo and Cabral 2017) with (emblematic) aquatic species such as the African manatee (*Trichechus senegalensis*) and the common hippopotamus (*Hippopotamus amphibius*). The park protects aquatic resources through a set of spatiotemporal fishing restrictions and bans on damaging practices. Several men have fishing ponds and craft traps, while others have canoes and nets. Women possess or often borrow a canoe to collect oysters in faraway places. Fathers provide their sons hooks and lines, but boys generally learn fishing from their peers.

The landscape of Elalab is dominated by mangrove and baobab trees adjacent to houses and spirits' shrines in which sea snail (*Cymbium sp.)* shells are placed. Mangroves surround the river, rice fields, and the permanent fishing ponds that villagers keep on abandoned paddies. This mosaic of habitats provides local populations with plentiful fish resources, and two distinct seasons result in mobile estuarine communities (IBAP 2008). During the rainy season, starting in June and ending in October, strictly freshwater species occupy the river. In the dry season, which occurs from November until May, high salinity levels allow the presence of marine species at juvenile or adult stages.

Data collection

Prior to this study, the third author researched socio-environmental and livelihood changes in nine Diola villages (Elalab included) using mixed methods, guiding our case study selection and contextualization. Direct and participant observation were conducted for seven months: February until March 2021, October and December 2021, and February until March 2022. This recurrent and long-term fieldwork allowed the first author to integrate into the fishing community, learn the local language (Kriol and some Diola dialect), and demonstrate commitment toward the people through financial contributions in terms of school supplies (back bags, pencils, notebooks) and fees and fishing equipment, *i.e.* fishing hooks and lines. He established friendship bonds during fishing trips with children, especially with the boys most actively involved in mangrove fishing with a line and a hook. All given vernacular names were triangulated by consulting five older fishermen as key informants (KI). We asked them to confirm the correct fish names, spell them, and provide background information on the presence and abundance of each species. Diola is a non-standardized, spoken-only language with many dialects, so Diola names provided in this paper follow local interpretations of correct spelling.

A total of 25 fish pictures were presented on separate cards (Table 1). The selected species were initially encountered on local fish landings or found in secondary literature (IBAP 2008; Lafrance 1994). Moreover, we included aquatic species that are absent in the region or less frequently fished by the community. Photographs of these fish were taken by the first author or obtained from the FishBase (https://www.fishbase.org) and BOLD (https://www.boldsystems.org) databases. Each card contained a number followed by the scientific name to facilitate the researcher's species recognition and a fish picture. After pre-testing, the first author chose to limit the number of cards to prevent children's attention from waning.

Photo elicitation tasks were introduced in the form of a game, and interviews were individually performed. All participants were asked to identify the fish using vernacular names in their local Diola dialect. We chose to use this methodological approach because pictures stimulate curiosity, provide sensory

Table 1 Presented fish species (n=25) during identification tasks with their scientific, English common, and Diola names. Fish pictures were taken by the first author or by the Center for Applied Fisheries Research (CIPA) in Guinea-Bissau, except for *Ilisha africana* (credits: P. Beelen, available at https://www.soortenjagers.nl).

Fish	Scientific	English common	Diola dialect
	*Carlarius parkii* (Günther, 1864)	Guinean sea catfish	Edjetenkai[1]
	*Carlarius heudelotii* (Valenciennes, 1840)	Smoothmouth sea catfish	Edjetenkai[1] Behau[1]
	*Caranx crysos* (Mitchill, 1815)	Blue runner	Kakisisenaku[1] Kakisisenadju[2]
	*Trachinotus teraia* (Cuvier, 1832)	Shortfin pompano	Kahentaku[1,4] Esenegalai[1,5] Djisenegaladju[2,5]
	*Coptodon guineensis* (Günther, 1862)	Guinean tilapia	Ewankai[1] Djiwankadju[2]
	*Sarotherodon melanotheron* (Rüppell, 1852)	Blackchin tilapia	Eokai[1] Djihokadju[2]
	*Pseudotolithus senegallus* (Cuvier, 1830)	Law croaker	Kaleliaku[1] Djileliadju[2]
	*Parachelon grandisquamis* (Valenciennes, 1836)	Largescalled mullet	Essukai[1] Djisokadju[2]
	*Neochelon falcipinnis* (Valenciennes, 1836)	Sicklefin mullet	Elepai[1] Djilepadju[2] Musukamu[2,3]
	*Pseudotolithus elongatus* (Bowdich, 1825)	Bobo croaker	Etowai[1] Djitowadju[2]
	*Ephippion guttifer* (Bennett, 1831)	Prickly puffer	Hurungunborahu[1]
	*Sphyraena afra* (Peters, 1844)	Guinean barracuda	Juntukasomai[1] Djintukasumadju[2] Entekasumai[1,3]
	*Drepane africana* (Osório, 1892)	African sicklefish	Kameronaku[1] Djimeronadju[2]
	*Pomadasys sp.* (Lacepède, 1802)	Grunt species	Kakokaku[1] Djikokadju[2]

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Fish	Scientific	English common	Diola dialect
	*Pseudotolithus typus* (Bleeker, 1863)	Longneck croaker	Elutai[1]
	*Galeoides decadactylus* (Bloch, 1795)	Lesser African Threadfin	Horokokahu[1,4] Ampaholal[1,5]
	*Hemichromis fasciatus* (Peters, 1857)	Banded jewelfish	Hutjulau[1]
	*Plectorhinchus macrolepis* (Boulenger, 1899)	Biglip grunt	Ehokulai[1] Djihokuladju[2]
	*Mugil bananensis* (Pellegrin, 1927)	Banana mullet	Essukai[1] Djisokadju[2] Elepai[1] Djilepadju[2]
	*Lagocephalus laevigatus* (Linnaeus, 1766)	Smooth puffer	Hurungunborahu[1]
	*Ilisha africana* (Bloch, 1795)	West African ilisha	Solma[1]
	*Ethmalosa fimbriata* (Bowdich, 1825)	Bonga shad	Kakubaku[1] Djikobadju[2] Hukobau[1,3]
	*Sardinella maderensis* (Lowe, 1838)	Madeiran sardinella	Kajabojaku[1]
	*Sardinella aurita* Valenciennes, 1847	Round sardinella	Kajabojaku[1]
	*Fontitrygon margaritella* (Compagno & Roberts, 1984)	Pearl stingray	Ebagalurai[1]

[1] Name of an individual with a bigger size; [2] Name of an individual with a smaller size; [3] More than one individual, plural
[4] Original, older name; [5] Newer, more recent name

stimuli, and maintain children's interest (see Sullivan et al. 2018). Relevant parents sometimes acted as translators from Diola to Kriol. One boy appointed himself field assistant and translated his peers' testimonies, creating a comforting interview setting for the children. Following Graham et al.'s (2015) ethical guidelines, prior parental consent was obtained after an initial briefing and the interviews could be terminated at any given time.

For the purpose of this paper, we defined fishing children as youngsters aged between 7 and 17 years old, following local explanation (Graham et al. 2015). One hundred children within this age range permanently live in Elalab, based on name listings provided by local schools. We employed a gender-balanced sampling of 45 children (24 boys and 21 girls with an average age of 12 years old) interviewed in November 2021 and February–March 2022.

Analyses

Interviews were recorded by mobile phone and, together with field notes, transcribed during analysis.

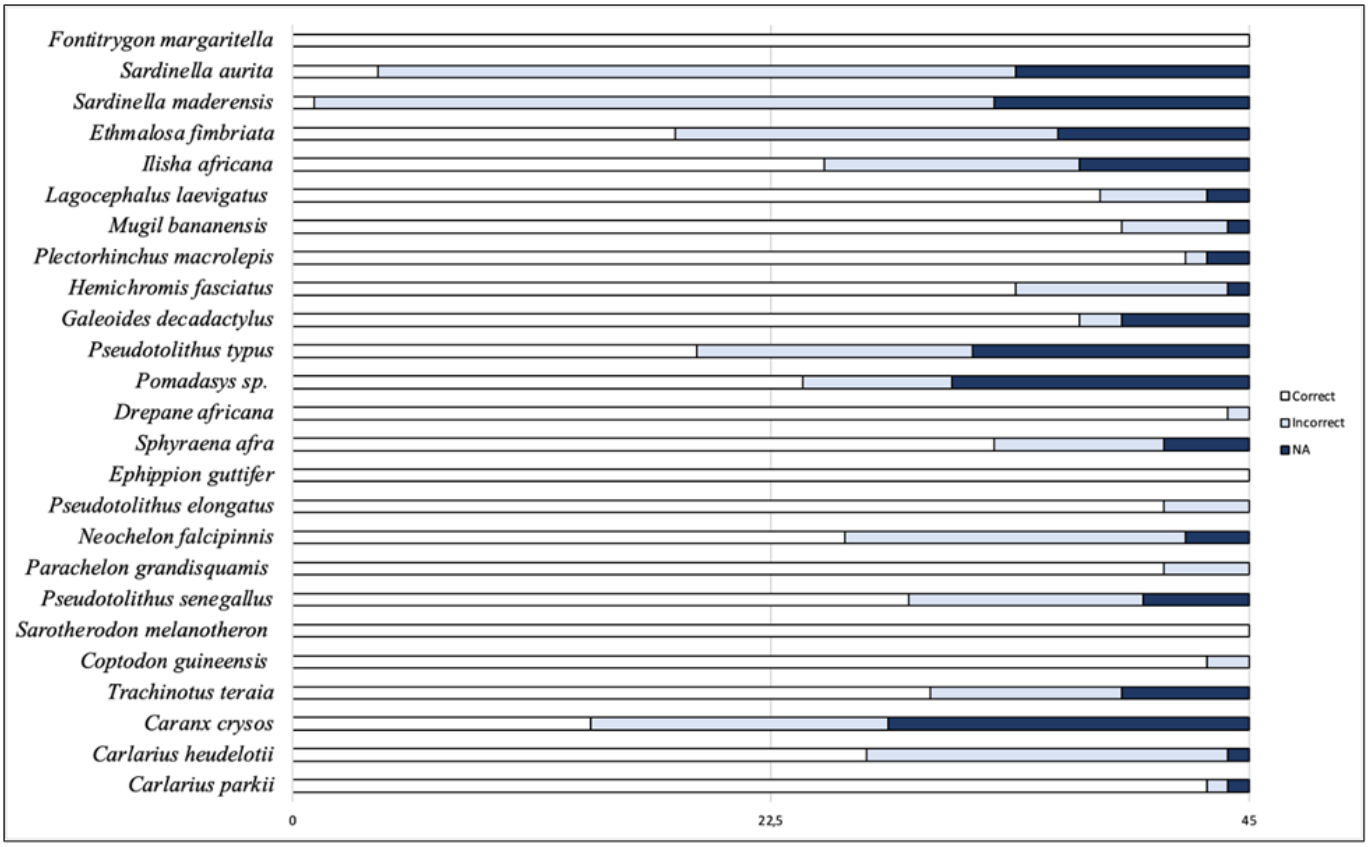

Figure 2 General identification of the different fish by all children (n=45). Response categories per species (n=25) are marked in different colors: correct (white), incorrect (light blue), and skipped (dark blue) answers according to child response numbers.

To investigate gender differences, we differentiated identification and non-identification per species by creating 2x2 contingency tables. The frequencies were calculated by summing up the correct answers (identified) and the incorrect and skipped answers (non-identified). Afterwards, we explored gender differences statistically by applying the Fisher exact test for each fish species, using SISA (http://www.quantitativeskills.com/sisa/). Fisher's exact testing was preferred to chi-square testing due to the small, expected values (<5), and the p-value <0.05 was set as significant (Campbell 2007).

Results

Identification tasks

A total of 20 different fish species were correctly identified by most children (>50%). All respondents properly named *Sarotherodon melanotheron*, *Ephippion guttifer*, and *Fontitrygon margaritella*. For two species (*Carlarius parkii* and *Carlarius heudelotii*), we accepted the general Diola name *Edjetenkai*, catfish. Interestingly, two girls specified the name for the latter, *Behau*, meaning red catfish in local dialect. Generally, it had a moderate recognition level because its name was frequently mistaken for *Esquilão* (local name in Creole, *Chrysichthys nigrodigitatus*), a more prevalent and similar-looking Bagrid catfish.

Few respondents identified *Pseudotolithus typus*, *Ethmalosa fimbriata*, and *Caranx crysos*, which were commonly mistaken for *Ethmalosa fimbriata* or *Ilisha africana*. Interviewees regularly confused *Pseudotolithus senegallus* with the two other Sciaenid species, as well as with *Pomadasys sp.* and *Galeoides decadactylus*. One boy identified *Sardinella maderensis*, and four boys recognized *Sardinella aurita*. Both sardine species were usually confounded with *Ethmalosa fimbriata*. A general overview of the children's responses along the identification categories is shown in Figure 2.

Gender differences

We found significant gender differences for six out of the 25 fish species (Figure 3): *Caranx crysos*

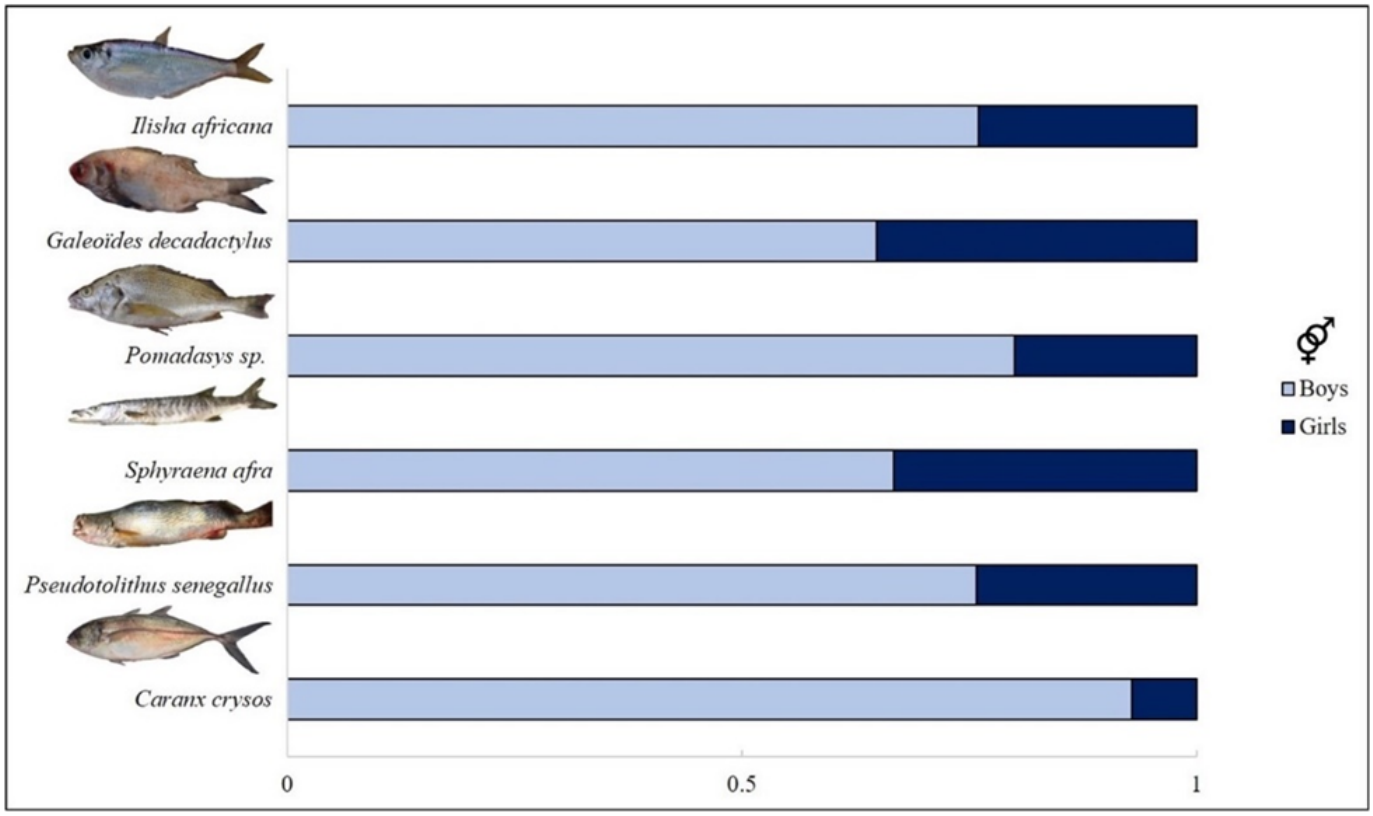

Figure 3 Significant gender differences for six fish species after Fisher's exact testing. The frequencies of identification results are shown for boys (n = 24) and girls (n = 21) separately. Pictures were either taken by the first author or by the Center for Applied Fisheries Research (CIPA), except for *Ilisha africana* (credits: P. Beelen, available at https://www.soortenjagers.nl).

(p=0.00031), *Pseudotolithus senegallus* (p=5.00E^{-05}), *Sphyraena afra* (p=0.00338), *Pomadasys sp.* (p=7.0E^{-5}), *Galeoides decadactylus* (p=0.00094), and *Ilisha africana* (p=0.00073). *Caranx crysos* was generally confused with *Ilisha africana* and *Ethmalosa fimbriata*, or unknown by boys, while half of the girls couldn't identify this species. The Diola names for the different Croakers were commonly interchanged by the girls. However, a large portion of the girls simply did not know the correct name for *Pseudotolithus senegallus*. Also, they mainly gave no answer for *Pomadasys sp.* or answered incorrectly. *Galeoides decadactylus* was identified by all boys, while for girls it was mostly unknown. A similar pattern was observed for the two remaining species: most of the boys correctly identified *Sphyraena afra* and *Ilisha africana*, while few girls could do so.

Discussion

Children's development roots in mangroves

Our results show that overall children's ethnoichthyological knowledge in Elalab is striking, as 20 fish species were correctly identified by more than half of the participants. The three species identified by all respondents are abundant, commonly fished, and eaten in Elalab (Table 2). Formal schooling does not include environmental topics on mangrove environments or fish diversity; thus, children's ethnoichthyological knowledge is fully acquired through participation in their coastal forest landscape. During the rainy season, boys fish separately from older males for smaller fish such as mullets and tilapias in the permanent fishing ponds or rice field canals, either for home consumption or to supply their mothers' sales. They walk with ease on the muddy, slippery dikes that connect their houses to schools in neighboring villages while spontaneously identifying proper fishing spots. During the dry season, they engage with peers in angling trips in the river using rowing canoes; they target the more profitable species like croakers, grunts, and rays and obtain money for personal use. Only girls over 15 years old collect oysters in the intertidal zone together

Table 2 Presented fish species with their abundance and whether they are fished by boys, as responded to by the key informants. The conservation status for each species on the IUCN Red Species List is also given.

Scientific name	Abundance[1]	Fished by boys[1]	IUCN[2]
Carlarius parkii (Günther, 1864)	▷	▶	LC
Carlarius heudelotii (Valenciennes, 1840)	▷	▶	LC
Caranx crysos (Mitchill, 1815)	▷	▶	LC
Trachinotus teraia (Cuvier, 1832)	▷▷	▶	LC
Coptodon guineensis (Günther, 1862)	▷▷▷	▶▶▶	LC
Sarotherodon melanotheron (Rüppell, 1852)	▷▷▷	▶▶▶	LC
Pseudotolithus senegallus (Cuvier, 1830)	▷	▶	VU
Parachelon grandisquamis (Valenciennes, 1836)	▷▷▷	▶▶▶	DD
Neochelon falcipinnis (Valenciennes, 1836)	▷▷▷	▶▶▶	DD
Pseudotolithus elongatus (Bowdich, 1825)	▷▷▷	▶▶	LC
Ephippion guttifer (Bennett, 1831)	▷▷▷	▶▶▶	LC
Sphyraena afra (Peters, 1844)	▷▷	▶	LC
Drepane africana (Osório, 1892)	▷▷	▶▶	LC
Pomadasys sp. (Lacepède, 1802)	▷▷▷	▶▶	LC
Pseudotolithus typus (Bleeker, 1863)	▷	▶	LC
Galeoides decadactylus (Bloch, 1795)	▷	▶	NT
Hemichromis fasciatus (Peters, 1857)	▷▷▷	▶▶▶	LC
Plectorhinchus macrolepis (Boulenger, 1899)	▷▷▷	▶▶▶	LC
Mugil bananensis (Pellegrin, 1927)	▷▷	▶▶	LC
Lagocephalus laevigatus (Linnaeus, 1766)	▷	▶	LC
Ilisha africana (Bloch, 1795)	▷▷	▶	LC

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Scientific name	Abundance[1]	Fished by boys[1]	IUCN[2]
Ethmalosa fimbriata (Bowdich, 1825)	-	-	LC
Sardinella maderensis (Lowe, 1838)	-	-	VU
Sardinella aurita Valenciennes, 1847	-	-	LC
Fontitrygon margaritella (Compagno & Roberts, 1984)			NT

[1]×: rare; ××: normal; ×××: a lot; -: not present. "×" represents the fish symbol used in the table.

[2]DD: Data Deficient; LC: Least Concern; NT: Near Threatened; VU: Vulnerable.

with their mothers from February until May, and they are responsible for fish selling on weekly markets all year round.

Elalab children share ethnoichthyological knowledge through mangrove work-and-play that complements their fishing activities. As they swim, cultivate rice, hunt (only boys), and collect wild edible plants, children ponder the perceived sensory cues during in-situ personal experiences, triggering a joint cognitive process (Ingold 2000; Nabhan 2002). Elalab boys become fishing experts as they grow older, learning, e.g., where to find certain species or proper fishing spots along the rice fields' canals and mangrove river, or how to handle fishing equipment requiring some craftsmanship and skills, for instance wooden traps, hooks, and cast nets. As illustrated in other rural communities (Zarger 2011), this continuous learning-by-doing promotes boys' confidence, independence, respect for nature, and gradual social status in society.

Within Diola's relationships with nature, mangroves represent a natural learning ground that forms individual and community identity, expressed through traditional beliefs and practices of natural resource management. These strong ties with nature foster a sense of shared environmental stewardship and consequently environmental protection, defining local responsibilities and understanding of the mangroves. However, we have observed that the conversion to Christianity (Catholicism and Evangelism) and the integration into a cash economy have weakened young people's respect for the elders' traditional values and rules of sustainable natural resource management. For instance, smaller captured fish are no longer immediately thrown back into the water by all fishers. Additionally, climate change and industrial fishing constitute a driver of aquatic resource change and an accumulative threat to coastal livelihoods, local diets, and coping mechanisms. Formal, modern education and migration are seen as a last resort to provide both the youth with a better future and the ones that stay behind with remittances to face their daily needs in times of diminishing rice harvests and fishing resources.

Species inconstancy

Socio-ecological changes are altering fish diversity and the fundamental functioning of mangrove ecosystems (Belhabib et al. 2015), and species fluctuations over a long period can influence people's collective memory of their natural surroundings (Turvey et al. 2010). The Elalab dialect of Diola can be used as a conservation tool for exploring (invasive) introductions and losses of fish. One example is provided by the recent observation of *Lagocephalus laevigatus* in local waters. Key informants attest that it has not received a unique Diola name and, hence, shares the vernacular name with *Ephippion guttifer*. Children use the simplified Diola name *ampaholal* for *Galeoides decadactylus*; this could reflect its worsening conservation status and locally decreased significance. Vernacular names can thus reveal hidden biological information useful for conservationists.

Elalab children did not know the names of Sardinella species because they are not present in the local mangroves (Table 2) and appear only in neighboring Senegal. The Diola dialect illustrates this fact, with locals using the name *Kajabojaku*, a Diola adaptation of the Senegalese Wolof name *Yaboy*. Sardines were confused with the similar-looking *Ethmalosa fimbriata* that is also locally absent (Table 2). Recently, people are encountering sardines at local

markets in the neighboring village of Susana through Senegalese merchants. Interestingly, a total of three boys and one girl mentioned this novel Diola name for *Sardinella aurita* and only one boy for *Sardinella maderensis*. This means that some children distinguish both species despite their local absence.

Gendered erosion of ethnoichthyological knowledge

The current work division related to fishing activities could lead to gendered erosion of ethnoichthyological knowledge in Elalab. Lack of fishing experience among girls is illustrated by their inability to correctly distinguish the threatened Sciaenid species that look morphologically similar. Following the drastic fish declines inside the rice field canals and men's increased engagement in net fishing as a source of income, female mangrove fishing has been reduced to oyster harvesting during the nineties. This limits girls' knowledge of fish to those they consume at home or encounter at local markets, where they sell the smaller mullets and tilapias caught by men and children together with their mothers. Few kids specified the name for *Carlarius heudelotii*, except for two girls. This may be because it is being sold smoked on neighboring markets in Senegal and Bissau.

Resource richness once allowed larger fish to form an integral part of the household diet, but nowadays locals prefer to sell them instead. Locally called *first-class* (Kriol: *purmeira*; but no Diola term) fish according to national and global markets' classifications, including *Pseudotolithus senegallus* and *Sphyraena afra*, are sold to merchants, retailers, or middle women by men. *Caranx crysos*, *Pomadasys sp.*, and *Galeoides decadactylus* are considered *second-class* (Kriol: *segunda*; no Diola term) because they make less money. Rather than being household staples, these highly valued species are quickly covered and stored at the village port, to be transported and sold in São Domingos city. However, girls can still encounter them on the market or through contact with boys. This explains their persistent knowledge of fish names, albeit limited compared to boys.

Conclusions: Children as sentinels for biodiversity loss

The article illustrates that children are important stakeholders within rural societies whose knowledge could be useful for participatory biomonitoring. As sentinels that grow up, their knowledge could secure the continuous assessment of local species and help inform management when biodiversity loss occurs.

Furthermore, if children stop encountering species, the community's intrinsic connection to the species' relevance and original status in the mangroves could also erode. Papworth et al. (2009) distinguish between knowledge *generational amnesia*, which occurs when people do not know the past conditions linked to age and experience (often children), and *personal amnesia* if individuals forget their own experiences throughout their lifetime. A *Shifting Baseline Syndrome of Fisheries* (Pauly 1995) among the children can thus locally occur with the progressive adaptation to resource depletion (Turvey et al. 2010). As children represent future leaders in society, an erosion of collective memory might even lead to what Jaríc et al. (2022) called the "*societal extinction of species*." As demonstrated by the Elabab girls, children's species identification can reveal knowledge erosion linked to a gap in knowledge transmission triggered by changing conditions and practices.

An important line of future research could emerge from studying early children's knowledge and its acquisition in parallel with comparative intergenerational baseline assessments. This would allow scientists and conservationists to monitor the status of ethnoichthyological knowledge among generations and genders and to assess current nature-society relationships. Moreover, children can act as sentinels for biodiversity losses and become integrated into public policies, reflecting their societal importance as rural actors. By strengthening children's relationships with fish, the (future) willingness to protect local species will contribute to the sustainable use of wild species in data-poor mangroves areas.

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Declarations

Permissions: The Nagoya Protocol was signed on

October 21, 2021, on behalf of the School of Agriculture (ISA) of the University of Lisbon and by the Ministry of the Environment and Biodiversity of the Republic of Guinea-Bissau. All the children participants' parents provided informed consent and were aware that the interview data would be used for publication and scientific purposes.

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