

## Documenting perceptions and misconceptions of shark conservation among students in Ghanaian coastal communities within the context of shark tourism

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### Abstract

*In Ghana, students have rarely been engaged in shark conservation programs. The study aimed to provide the perceptions and misconceptions about sharks among students in Ghana. From the Western region of Ghana, two senior high schools were visited from March to June 2023, and 111 questionnaires were administered to them with the assistance of a resident teacher. Most of these students believe that i) sharks do not eat humankind as food, ii) fishing activities do not affect shark behavior, iii) the decline in fish does not affect the shark population, and iv) fishermen in Ghana face a lot of shark attacks. On perceptions, most of the students perceived that i) shark fishing should not be stopped, ii) shark ecotourism will yield more money than shark fishing, and iii) MPAs will conserve shark population in Ghana. From the study, it was evident that knowledge and attitudes showed a strong positive correlation ( $r = 0.61$ ). Therefore, incorporating shark related topics into the curricula of schools, taking students on educational tours to the fishing communities, and engaging them in outreach programs will enlighten their knowledge of sharks and foster their awareness of shark conservation and shark ecotourism in Ghana.*

**Keywords:** Senior high school, Shark fining, Shark tourism, Shark MPAs, Ghana

### 1. Introduction

With community support for protecting aquatic resources, measures for conserving marine biodiversity would likely be possible. As such, stakeholder support and collaboration are necessary to manage aquatic resources. Public engagement is required to support biodiversity conservation and management initiatives, possibly through classroom involvement, outdoor activities, and outreach events. By promoting improved understanding and attitudes regarding local environmental preservation, nature-based educational programs aim to influence the attitudes and behavior of children toward the environment (Pooley & O'Connor, 2000). Education in biodiversity conservation programs may enhance knowledge and skills as well as develop critical thinking, while information alone does not necessarily translate into more environmentally conscious behavior (Christensen et al., 2007; Smith-Sebasto & Cavern, 2006). Additionally, studies have demonstrated that actions and knowledge may change the attitude of people toward the conservation of natural resources (Karris et al., 2020; Martinis et al., 2018).

In some African schools, children do not learn about marine animal ecology as well as the kinds and importance of

these aquatic resources found locally compared to their counterparts in Western schools, even though their community or family livelihoods may depend heavily on the local environment (Kioko et al., 2010). As a result, information from parents, relatives, and peers—frequently the sources of misconceptions - is constantly bombarding the thoughts of these children. Children with such environmental misconceptions spell disaster for conservation efforts since they prevent them from actively participating in any conservation efforts. Children are taught to understand their environment and the need to maintain the resources found there through education programs that strongly focus on biodiversity and ecosystem services (Borressn et al., 2023). Programs for environmental conservation are preoccupied with reversing the alienation from nature by altering knowledge and attitudes (Kioko & Warui-Kiringe, 2010).

According to marine resource users, every public member may participate as an agent of change to solve problems existing in the marine environment by altering their behavior. The constructivist hypothesis states that ideas and interpretations of a subject determine how students understand reality. Ecological knowledge is the critical building block for promoting environmental education among students, and

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if the foundation framework is not constructed correctly, learning advanced ideas, particularly those relating to complicated ecological concerns, would be hindered (Tsoi et al., 2016).

Students are more likely to adopt unfavorable opinions if exposed to misconceptions about unusual creatures or false information in the media. On the other hand, students with more environmental knowledge typically have positive views (Tsoi et al., 2016). Although multiple studies show that people usually show an unfavorable attitude toward large predatory creatures, public support for shark preservation is still required. There are unsettling misconceptions about sharks, particularly the Great White shark, one of the world's most feared and mysterious animals (Tsoi et al., 2016). In view of this, the biological importance of sharks to the marine ecosystem must be well understood and addressed.

Due to the unfavorable view of sharks in most cultures as vicious predators in movies, interest in and support for shark conservation among students is largely limited. Misconceptions about sharks and the general inaccessibility of scientific information on sharks may limit public participation in shark conservation activities (Friedrich et al., 2014). According to Garla et al. (2015), students' knowledge level can strongly influence their unique attitudes and behaviors regarding the conservation of natural resources. Studies have shown that participation in school activities and clubs significantly contributes to increased environmental awareness among students. Also, environmental decisions made by adults are based on the lessons they learned as children.

Furthermore, it has been documented that school activities and organizations have a significant impact on raising awareness of issues bothering on conservation of environmental resources among students (Ajiboye & Silo, 2008). Unfortunately, attitudes and engagement in environmental conservation issues in Ghana among students have been less studied. Given the dire status of many shark populations worldwide, it is critically necessary to identify the misconceptions and perceptions of knowledge on shark ecology, fisheries, and attitudes among students geared toward shark conservation efforts (Acuna-Marreo et al., 2018). Following the paucity of information, the study aimed at i) evaluating misconceptions of sharks and shark fisheries among students, ii) their attitudes towards sharks and perspective on shark conservation, and iii) the relationship between knowledge and attitudes towards shark conservation among students. The knowledge acquired from this study will help promote and foster shark conversation among students in Ghana.

## 2. Materials and methods

Ethics committee approval is subject to the practices of the author's institution. For this reason, the author states that he conducted the research within the framework of ethical principles (25.02.2024).

### 2.1. Study area

The study was conducted in two landing communities along the coast of Ghana. These include Axim and Dixcove (Figure 1). Ghana is a Western African nation bordered by Burkina Faso to the north, Republic of Côte d'Ivoire to the west, Togolese Republic to the east, and Gulf of Guinea to the south. Ghana lies along the Gulf of Guinea and has an area of about 239,000 km (Seidu et al., 2022). The west coast extends from the Ghana-Côte d'Ivoire border to the Ankobra 215 River estuary. From the Ankobra Estuary to Tema, the central coast has rocky headlands and sandbars enclosing coastal lagoons (Seidu et al., 2022).

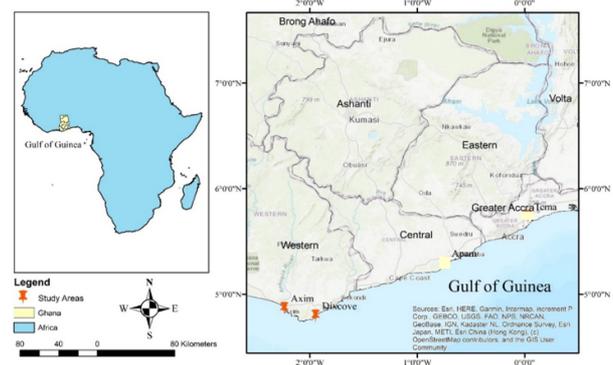


Figure 1. A map showing the study areas

Axim is located in the Nzema East District (N 04.8665° N, N 04.2409° W). There are 13,509 households in the district with a household population of 59,250, and Axim alone has about 5,001 households, 2,951 houses, and a population size of over 9,623 (GSS, 2014). Dixcove community falls within the Nzema East Municipality and Ahanta West. The artisanal fishing port of Dixcove, located in Ghana's Western Region (N 04.79368°, W 01.94612°), consists of three landing beaches, namely the Upper Dixcove, lower Dixcove and Eurom, with over 1,081 fishermen (Dovlo, 2016). Farming is an essential source of livelihood, with about 90% of men engaged in fisheries. Most women process and sell fish landed by the men.

### 2.2. Research technique

From March to June 2023, students from two senior high schools took the validated survey. The choice of the sample design was based on the type of target population (Kothari, 2004). The respondents in this study were between 15 and 18 years of age and students who attended any of the schools in the chosen study areas. These conditions indicated that only students within the defined age ranges and the schools attended could participate in the study. With the assistance of their class teacher, 111 students from the selected schools were given questionnaires to complete. Verbal consent was sought by politely and discretely asking students whether they would mind doing a brief survey. The questionnaire was written in only one language, English, and segmented into three sections: Section A, which deals with socio-demographics; Section B, which deals with shark knowledge;

Section C, which deals with shark fisheries information; and Section D, which deals with attitudes.

2.3. Data analysis

After the interviews, open-ended qualitative questions were coded to analyze the responses collected quantitatively. The normality test was conducted before data analysis to ascertain whether the sample data was normally distributed. By analyzing all response frequencies, the objectives of the study were satisfied. The proportion of binary replies (Yes/No) was examined using Pearson chi-square. This was more suitable given the objectives of the study and the methodology used. Pearson correlation was used to evaluate the association between attitudes and knowledge among students at a significance level of 5%. All analyses were performed using the Statistical Package for Social Sciences (SPSS) version 26.

3. Results

Over two-thirds of the students interviewed were females, while 28 % were males (Table 1). The significantly higher number of females than males (Chi-square,  $X^2$  value = 21.631,  $df = 1$ ,  $p$ -value < 0.001) was because one of the schools selected for this study was an all-female school. Less than 30 % of the students said they did not stay within the fishing communities, whereas most affirmatively responded (Table 1). The number of students residing within fishing communities was significantly higher than students outside the fishing communities (Chi-square,  $X^2$  – value = 35.757,  $df = 1$ ,  $p$ -value < 0.001) because these schools are situated within the fishing communities which more accessible to students from the communities.

Table 1. Demography of respondents

Variables	n	%	$X^2$	df	p
<b>Gender</b>					
Female	80	72.1	21.631	1	<0.001
Male	31	27.9			
<b>Staying close to the beach</b>					
No	24	21.6	35.757	1	<0.001
Yes	87	78.4			

More than 70 % of the students knew that sharks are dangerous to humanity and play a predator role within the marine ecosystem. Only 60 % of the students did not agree that fishing affects the behavior of sharks. In addition, a little above 50 % did not believe that the shark population was declining. However, 64 % did not agree that humans are the feeding items of sharks. Regarding attitude towards shark conservation, most students (95 %) agreed that shark fishing brings more money than other target fishes. As a result, the majority of the students (68 %) did not agree that shark fishing should be stopped (Table 2).

Furthermore, only 87 % of the students believed that creating marine protected areas (MPAs) would conserve the shark population in Ghana. A little above 50 % of the

students felt that fishermen face a lot of shark attacks in Ghana. Only 8 % of the students did not believe shark ecotourism would financially benefit fishing communities (Table 2).

Concerning the diets, when asked which feed items sharks consume, more than two-thirds of the students selected fish as the main feed item for sharks. Also, most students (over 70 %) believed that shark catches by fishermen are responsible for the decline in the shark population (Figure 2).

Table 2. Shark knowledge and attitude among senior high school students in Ghana

Shark knowledge, and attitude	No	Yes
Sharks dangerous to mankind (K)	22	78
Fishing activities affect shark behavior (K)	60	40
The decline in fish population affects shark population (K)	53	47
Sharks play predator roles in the marine ecosystem (K)	18	82
Sharks eat humans as their food (K)	64	36
Shark fishing brings more money (A)	5	95
Stop shark fishing (A)	68	32
Shark MPAs will conserve sharks (A)	14	87
Fishermen face a lot of shark attacks in Ghana (A)	43	57
Shark ecotourism will be more money than sharks (A)	8	92

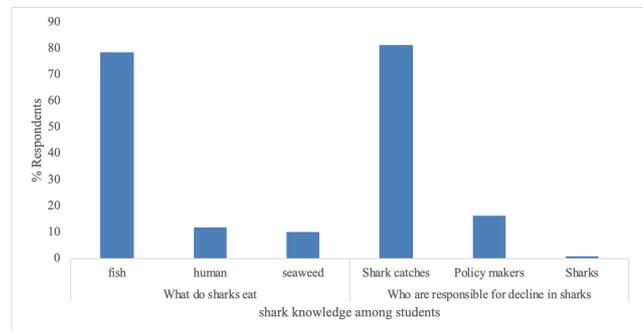


Figure 2. Percentage of students' opinion on some aspects of shark knowledge

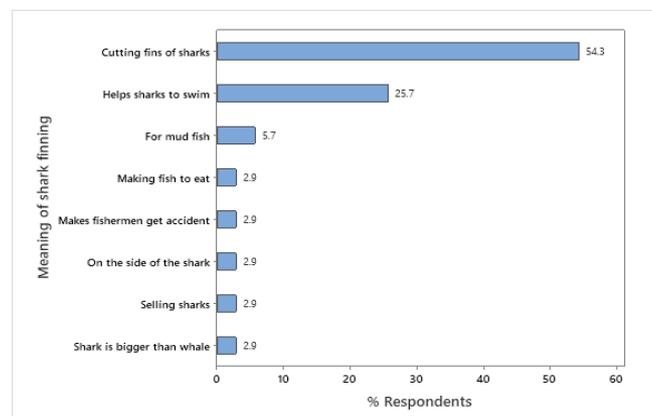


Figure 3. Percentage of students' responses on the meaning of shark finning

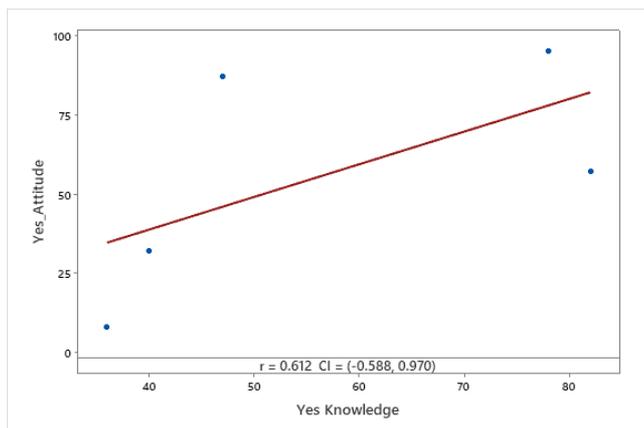


Figure 4. Correlation between the index of knowledge and the index of attitude among students

When asked about the meaning of shark finning, most students had no idea (78 %). However, out of the 22 % of the students who affirmed their understanding of shark finning, 54 % provided correct answers, while 46 % provided incorrect answers. Samples of wrong answers given by these students are shown in Figure 3. Correlation analysis between the index of knowledge on sharks and the index of attitude towards shark conservation showed a strong positive association (Figure 4).

More than 70 % of the students staying within the fishing communities agreed to the following issues of shark fishing in Ghana, namely: i) shark products are consumed locally, ii) shark fishing occurs in Ghana, iii) sharks are accidentally caught in Ghana, iv) shark population affects the catch of fishermen and v) aware of shark finning or trade. However, less than 30 % of students who do not stay within the fishing communities portrayed poor knowledge of shark fishing issues in Ghana (Figure 5).

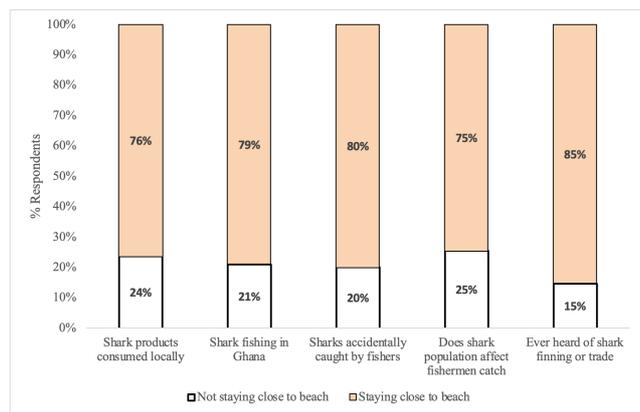


Figure 5. Responses by students staying within and outside the beach on shark fishing issues in Ghana

### 5. Discussion

This research offers preliminary information on student knowledge of shark and shark fishing activities in Ghana with emphasizes on second-cycle colleges. Many students vehemently disputed the following claims: i) fishing operations affect shark populations, and ii) fish populations

decline affect shark populations. In addition, many students provided incorrect responses on shark finning which demonstrates the need for more awareness of shark fisheries among students. During this survey, students also pointed out another misconception about sharks; that is, sharks are dangerous to humankind. Most of these misconceptions about sharks that students hold possibly come from parents, classmates, and media outlets. However, positively framed communications about the conservation of sharks will produce a more positive impact than negatively framed messages (Casola et al., 2020; Jacobson et al., 2019).

Shiffman et al. (2020) posited that people who need to be more informed about biodiversity resources could weaken prevailing successful conservation initiatives by actively pursuing the wrong information dissemination. Students having these misconceptions about sharks are perhaps unlikely to contribute meaningfully to any conservation efforts relating to sharks entirely. Fortunately, a substantial number of the students correctly perceived that i) fish is the primary food source for sharks, ii) sharks play a predatory role, and iii) the decline in shark populations was due to fishing mortality. However, for students to understand these perceptions which are essential for shark conservation, they need to gain knowledge of the trophic interactions between sharks and other marine species as well as the processes by which shark catches are declining in Ghana. For instance, students are unaware that sharks, as top predators, maintain the food webs directly by regulating prey dynamics and behavior. Hence, removing sharks can alter ecosystem functioning and shift food web dynamics (Ferretti et al., 2010; Heithaus et al., 2008).

Regarding attitudes pertaining to shark conservation, many of the students correlated the size of the shark species to financial benefits; hence, the bigger the size, the more valuable the shark is to traders. Clarke et al. (2007) documented that fisherfolks use the thickness, color, length, needle texture, and species type to price shark species in the fishing communities. In addition, Seidu et al. (2022) reported that an average of 90 % of fisherfolks generate more revenue from shark fisheries because fisherfolks receive twice the usual income from shark products and fins. These immense benefits may have fueled the perception among students that shark fishing should continue. On the contrary, studies by Seidu et al. (2022) suggest that fisherfolks should reduce the rate of fishing for sharks in Ghana, especially in the wake of population decline (Ward-Paige et al., 2012). The perceived economic gains from shark fishing may have favored the positive reaction to shark fishing among students.

The support for shark MPAs among students may be motivated by the high economic benefits of the shark fin trade rather than the ecological advantages of MPAs to species conservation. This demonstrates unequivocally that students need to know the environmental advantages of MPAs, in order for the institutionalization of MPAs to achieve their ecological benefits. Many of these students have ethnic links to coastal communities where tourism and fishing are

significant sources of revenue for many locals. As such, these students have first-hand information about the benefits of tourism to the individual, society, and country. Shark tourism is an industry that creates millions of dollars annually and stimulates the development of dependent fishing communities while fostering conservation efforts (Ziegler et al., 2021; Zimmerhackel et al., 2019; Vianna et al., 2018). Therefore, it was not surprising to see most of the students favoring the perception that shark ecotourism is an avenue that will yield more revenue than shark fishing. For shark tourism to gain its full potential in fishing communities in Ghana, further studies are needed to map out shark habitat use as well as shark migrating patterns for feeding and spawning purposes. However, shark tourism should not be viewed as a panacea to the declining trend in shark population in Ghana.

Although sharks rarely attack fishermen (Garla et al., 2015), many students believe such attacks occur frequently. However, such misconceptions about sharks tend to discourage them from partaking in activities inclined to the conservation of sharks. Again, having such misconceptions about sharks coupled with negative attitudes toward shark conservation suggests that additional education on shark fishery is necessary to safeguard the shark population and the integrity of the marine ecosystem of Ghana. The varying views of students staying in and outside the fishing communities about conservation issues may be due to proximity to the beach, access to knowledge, and attitudes (Garla et al., 2015). As such students without close proximity to the fishing communities tend to have inadequate understanding of shark fishing. This demonstrates that having a connection to fishing communities improves knowledge of sharks among students. Furthermore, the lack of knowledge about sharks among students may limit their motivation to protect these vulnerable species. Therefore, regular field excursion to shark fishing communities may deepen their connection to these creatures and instill in them the need to protect these species.

The high positive correlation between the knowledge and attitude indices indicates that having a greater understanding of sharks fosters a good attitude toward shark conservation strategies. As a result, impacting knowledge on sharks will accelerate behavioral change in attitudes toward a positive commitment to shark conservation among students (Agyeman et al., 2021; Fletcher & Potts, 2007; Thompson & Mintez, 2002). Also, increase in education predicts less fear of large carnivorous species with more positive attitudes toward species conservation (Giovos et al., 2021; Le Busque et al., 2021; Bargnesi et al., 2020; O'Bryhim & Parsons, 2015; Friedrich et al., 2014; Kaczensky et al., 2004; Røskaft et al., 2003). Therefore, educating students on issues relating to sharks will be essential in improving their involvement in shark conservation strategies. Thus, to increase the engagement of the next generation in the conservation of sharks in Ghana, scientists and

conservation groups need to educate students with the relevant education materials (Giovos et al., 2021).

## 6. Conclusion

The study sought to identify some misconceptions and perceptions students hold about sharks in Ghana. From the survey, many students displayed poor knowledge of shark ecology, biology, and shark fisheries. The high rate of poor understanding among students demonstrates the importance of providing them with factual education. This activity will strengthen their bond with sharks and fuel their enthusiasm for participating in shark conservation efforts in Ghana. From the study, strategies for involving students in shark conservation in Ghana may include beach outings, awareness campaigns, incorporating shark-related curriculum in schools, and mentoring with conservation groups.

### 6.1. Limitations and future directions

This study only focused on two fishing communities in the western corridor of Ghana. Therefore, future research should include fishing communities from other coastal regions. This will provide a comprehensive view of attitudes about sharks among students. In addition, future studies should consist of other indicators of perception and knowledge among students regarding shark conservation efforts in Ghana.

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### Author contributions

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### Disclosure statement

The author reported no potential competing interest.

### Ethics committee approval

Ethics committee approval is subject to the practices of the author's institution. For this reason, the author states that he conducted the research within the framework of ethical principles (25.02.2024).