

Promoting sharks and ray literacy through an interactive outreach experience

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INTRODUCTION & AIM

Elasmobranchs (sharks and rays) are among the most threatened marine species globally, (Jabado et al., 2024) yet they often suffer from public misconceptions or a lack of basic biological knowledge. In coastal regions where the fisheries sector is a pillar of the local economy, fostering **marine literacy** is crucial for long-term conservation (Shellock et al., 2024). Public outreach events, such as the **European Researchers' Night**, provide an effective way to bridge the gap between the scientific research and the community (Kelly et al., 2022).

The **primary aims** of this study were:

- To evaluate the effectiveness of a **short-term hands-on intervention** in improving the understanding of elasmobranch biology and ecology among a young audience.
- To assess changes in **perceptions and attitudes** regarding the conservation of sharks and rays.
- To promote engagement with **citizen science initiatives** (e.g., The.Shark-Ray.Map) as a tool for active conservation.

METHODS

Participants and setting. The intervention was carried out in a coastal region with a significant fishing tradition. A total of N=51 participants were recruited (mean age of 9.93 ± 5.97 years, 54.90% female). The majority were primary school students (78.43%).

The **instructional sequence** was designed as an interactive circuit (Fig. 1) combining:



Figure 1. Stand of The.Shark-Ray.Map during the European Researchers' Night held at the University of Oviedo.

Data collection and analysis. A pre- and post- questionnaire were used to measure learning outcomes. The tool consisted of 4 demographic and 10 content-related questions, including visual tasks (drawing eggs and adult specimens), Likert scales (to quantify attitudes and perceived threats), and open-ended questions (to explore justifications for conservations). Data were processed using descriptive statistics and pre-post comparisons.

RESULTS & DISCUSSION

Biological knowledge

The **"egg case" gap**: Initially, while participants could draw adult sharks and rays, their representations of eggs were highly inaccurate, probably due to the fact that they had never seen before shark (43,14%) or ray egg cases (52,94%). Post-intervention drawings showed a notable increase in precision, demonstrating the power of using real biological samples, scientifically accurate models and taxonomic guides.

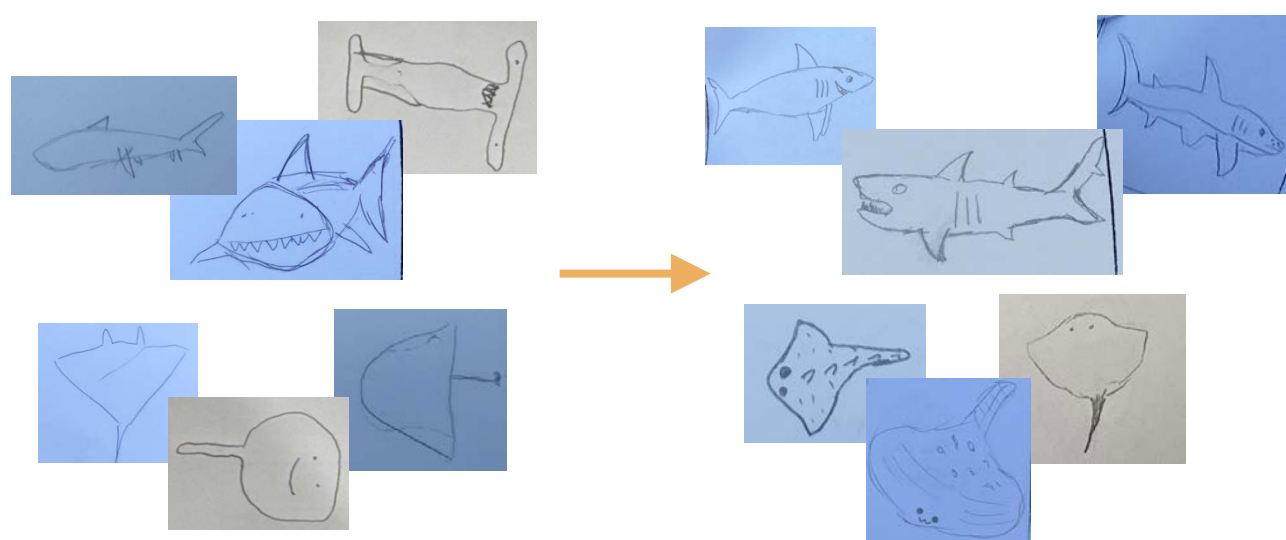


Figure 2. Drawings of adult specimens before (left) and after (right) the intervention. Shark drawings, top; ray drawings, bottom.

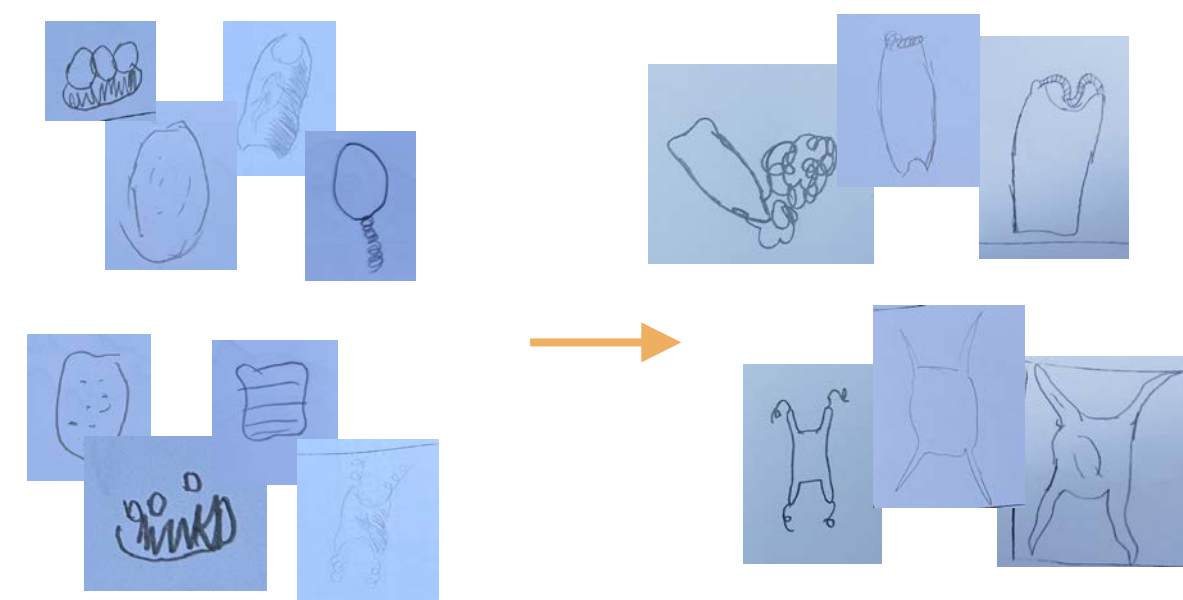


Figure 3. Drawings of egg cases before (left) and after (right) the intervention. Shark drawings, top; ray drawings, bottom.

Species awareness: Knowledge was heavily biased toward iconic shark species, which was notably enriched after intervention. Awareness of ray diversity slightly improved after intervention (from 47,1% of participants not knowing any species to 12,9% in the post-test), it still remains a challenge for future educational programs.



Figure 5. Pre and post comparison of shark (right) and ray (left) knowledge species.

Citizen Science Engagement

Post-tests results showed a high willingness to report sightings and search for egg cases on beaches, disseminate conservation information, and enroll in projects like The.Shark-Ray.Map.

Classification: identification of sharks and rays as fish and vertebrates notably improved after intervention.

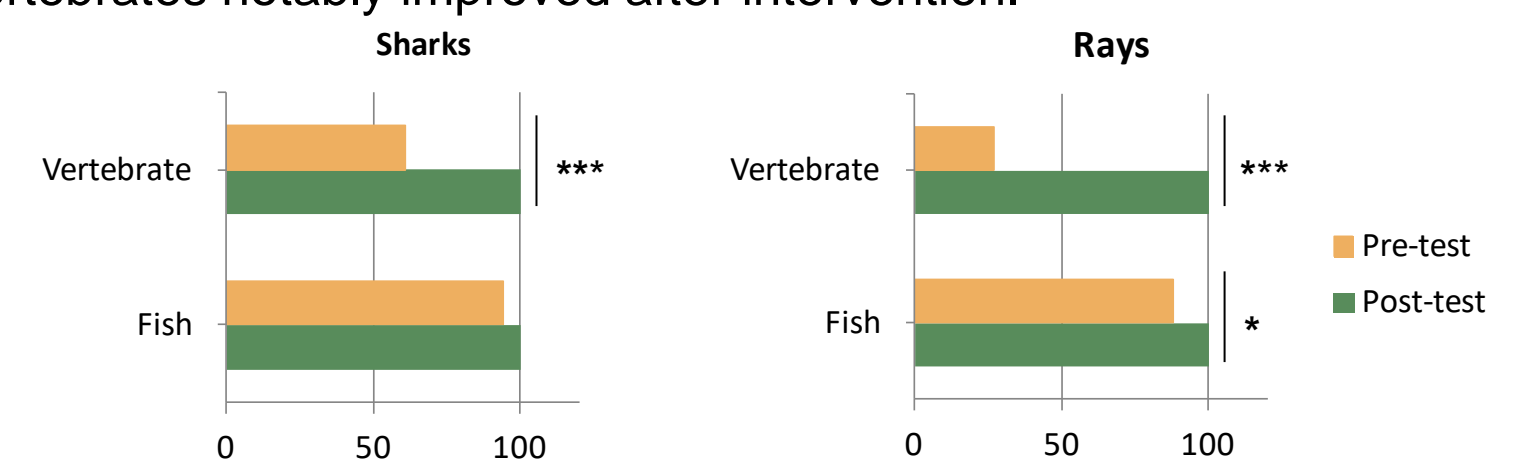


Figure 4. Pre and post comparison of shark (right) and ray (left) classification as fish and vertebrates. Two-sample proportion test: * p<0.05; *** p<0.001.

Perceived threats

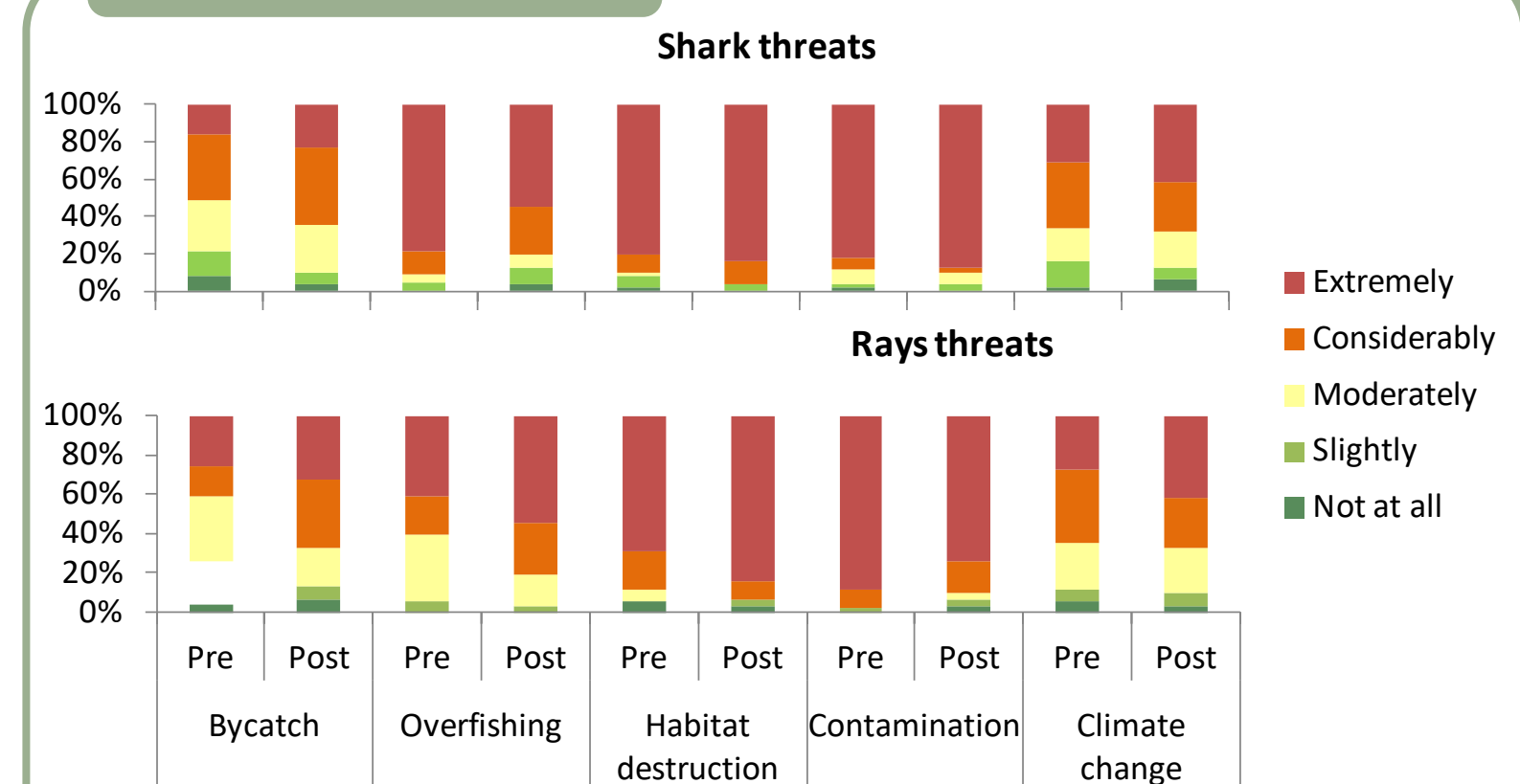


Figure 6. Pre and post comparison of shark (top) and ray (bottom) threats.

CONCLUSION AND FUTURE WORK

Interactive outreach activities that integrate real biological specimens are highly effective in enhancing marine literacy. This intervention successfully shifted perceptions from "fear" or "general worry" to action-oriented conservation among younger audiences.

Future work involves:

- Scaling up: integrating this model into formal school curricula across the region to reach larger audiences and enable long-term interventions.
- Focus on rays: developing specific modules to improve the identification and appreciation of ray diversity, which remains overshadowed by sharks.
- Longitudinal tracking: evaluating if the increased willingness to participate in citizen science translates into actual data reporting over time.

Conflict of interest: The authors declare no conflict of interest.

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