Pedagogy Option 8: Community Science Engagement Reflection

Millennium Oceans Prize

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Endeavor STEM Teaching Certificate Project

SCED 530: Lessons from the Ocean: Science on the Water Planet

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Part I

As background, there's a national ocean prize competition that is returning for its ninth year in 2023, "**The Millennium Oceans Prize"**. This is an international competition which supports and celebrates students and organizations that are passionate about conserving, protecting, and sustainably using oceans, seas, and marine water and life. In 2020, the prize was awarded to scientists working on behalf of the Universidad Technologica Indoamerica, Ecuador. **Their objective was to study the population of Giant Manta Rays (Mobula birostris) as a flagship species to demonstrate the growing problem of human-induced pollution to the ecosystem in the southern region of the Eastern Pacific (Isla de la Plata and Bajo Copé), an area where studies and data on this topic are scarce.** *Researchers collected photo-ID data (using high-resolution underwater cameras) and mark-resight techniques as well as satellite tagging to describe the demographic structure, population size, and possible environmental drivers, in this case human-induced pollution, on the seasonal aggregation of M. birostris at these locations.* Photo-ID, Mark-resight, and Satellite tagging are methods of identification that are widely used in wild-life ecology to generate estimates of species population size and trends.

It is important to note Giant manta rays are an endangered population as defined by CITES (Convention on International Trade in Endangered Species). This was a 14-year study which identified greater than **2,800 individual giant manta rays** (more than any other study to date) drawn to this region near their foraging grounds to clean, socialize and even find mates. As part of the project, a team of professional wildlife and underwater photographers captured, through high impact photographs and a short documentary, the ecosystems this threatened species inhabit. As a bonus, the research group also revealed the beauty of a relatively unknown area of the ocean with the audiovisual material subsequently displayed on social media:

1. **To reveal the beauty of an underwater world still relatively unknown to many.**

2. **To raise awareness and demonstrate the power of conservation – a message that can easily reach all people, regardless of language, age, geographical location, education level or social condition.**

Through analysis of their collected data, researchers found that Mobula rays are highly susceptible to incidental capture in a wide variety of fishing gear types, including longlines and purse seine nets used by local fishermen. **The study revealed an alarming finding that over 500 individual manta rays showed human-induced scarring, mainly from nets or fishing line entanglement-highlighting a significant threat from fishing in the region**. Many of the mantas were so badly entangled within heavily fouled nets that the lines would embed into their skin. *Of the 563 M. birostris that had injuries, more than half (n=348; 61.8%) were either entangled or showed evidence of previous line scarring*. Previous satellite tagging revealed that M. birostris spend most of their time within two meters of the surface, which exposes them to a very high risk of entanglement with fishing gear as well as vessel strikes. **Even when released from entanglement, post mortality rates exceeded 57%.** *Researchers also discovered that local fishermen routinely targeted rays during periods when target fish species were scarce.*

Researchers further stated, that although some protection measures are in place, changes to food web dynamics may impact foraging opportunities for the rays, potentially causing shifts in their distribution and movement patterns that may increase their susceptibility to incidental capture, especially in regional fisheries.

In their **conclusion**, the researcher's analysis of photo-ID data suggests that *M. birostris currently face threats from entanglement in fishing gear and are at risk of entanglement and*

injury in both commercial and local fishermen nets, longlines, and gillnet fisheries. The high incidence of entanglements and prevalence of unnatural injuries (human-induced pollution) on the manta rays in this region underscores fishing as a significant threat to this species, which needs to be addressed by any future management plan. Giant oceanic mantas became a protected species in Ecuador in 2010, however, expansions and better protection of their critical habitats are currently underway.

Part II

I would integrate the findings of the research paper into my lessons as follows:

I. **Give a brief interactive lesson on the Millennium Oceans Prize. Emphasizing that the prize focuses on the <u>ten primary learning targets</u>, associated with SDG (Sustainable Development Goal) 14:**

1. Reduce marine pollution
2. Protect and restore ecosystems
3. Reduce ocean acidification
4. Sustainable fishing
5. Conserve coastal and marine areas
6. End subsidies contributing to overfishing
7. Increase the economic benefits from sustainable use of marine resources
8. Support small scale fishers
9. Implement and enforce International Sea Law
10. Increase scientific knowledge, research, and technology for ocean health.

I would follow this up with instructional, informative video presentations from the Millennium Oceans Prize Website as well as videos from previous winners: https://www.millenniumoceans.org/

II. Interactive Game Module (use NOAA Fisheries website)

i. https://www.fisheries.noaa.gov/species/giant-manta-ray

a. Kahoot based game using Bloxels focusing on:

i. **Species description**

1. Habitat
2. Size
3. Population status
4. Appearance
5. Behavior
6. Diet

ii. **Conservation and Management**

1. Satellite tagging
2. Basics of photo ID and resight marking techniques
3. Current threats to survival
4. CITES classification (discuss what endangered means)

iii. **Additional Resources**

1. Example of Aerial survey ID

2. Fishery Observer ID Guide

III. A Tour of the Marine Megafauna Foundation Website with videos

a. Learn about purpose and scope of foundation
    i. https://marinemegafauna.org/
b. Briefly review 2022 Impact Report – focusing on Manta rays
c. Participate in Save Ocean Giants Campaign
    i. Sign up for and periodically review newsletter
    ii. Adopt a Manta ray program
    iii. Fundraising through “Shop using Amazon Smile”

IV. Summation integrating recent United Nations 30 by 30 agreement

a. New Global Framework for Managing Nature Through 2030
b. Via video and website:
    i. https://www.campaignfornature.org/un-convention-on-biodiversity-proposes-protection-of-at-least-30-percent-of-the-planet-by-2030