

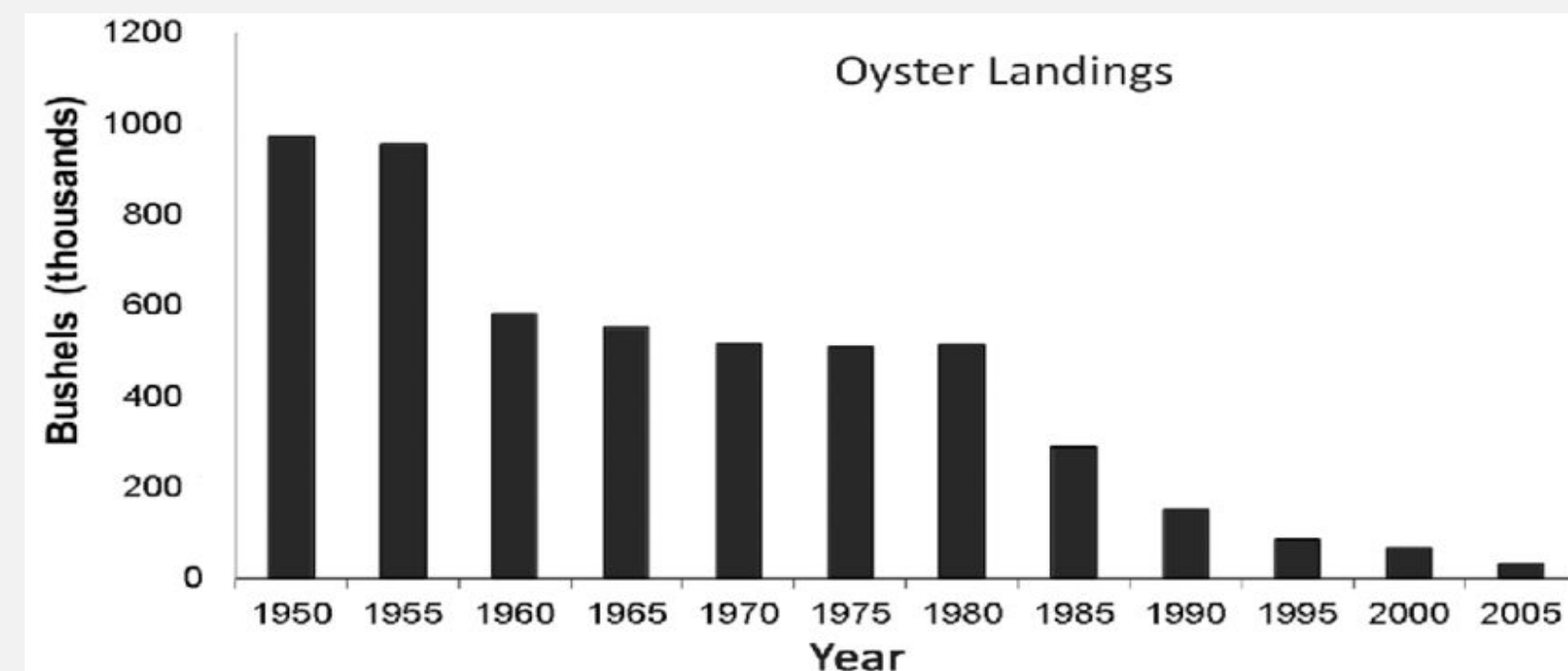
# Oyster Shell Recycling

Katie Chan<sup>1</sup>, Anika Agrawal<sup>2</sup>, Alexandra Blas<sup>3</sup>

<sup>1</sup>Joel Barlow High School; <sup>2</sup>UConn Department of Natural Resources & the Environment; <sup>3</sup>UConn Natural Resources Conservation Academy

## Project Motivation & Goals

- Oyster restoration helps re-install the many benefits oysters provide. For example, oysters sequester carbon, improve water quality, decrease shoreline erosion, support other species, and more.
- Native oyster populations in Connecticut, New Jersey, Delaware, and the Maryland-Virginia area have been significantly declining since around 1960 (Fig. 1). This is due to a number of factors<sup>1</sup>, including historic over-harvesting or unsustainable harvesting, disease, pollution or poor water quality, and habitat loss.
- Recycling and returning oyster shells (that would otherwise be discarded as waste) back to their natural environments has the ability to replenish these declining oyster populations.



**Figure 1.** Landings of oysters from Connecticut, New Jersey, Delaware, and Maryland-Virginia, 1980 to 2005. Source: U.S. Fisheries Statistics and Fisheries of the United States<sup>2</sup>

- This project explores environmentally beneficial ways of recycling and reusing oyster shells, as well as using research to spread education about the importance of oyster restoration. The objectives were to:
  - Research the many different benefits of oyster shell recycling
  - Connect with restaurants who might be discarding their oyster shells
  - Increase education about the importance of oyster restoration

## Project Components

### Research and Analysis

- December 2023: Visited an oyster farming site in Long Island Sound off the coast of Norwalk with community partner, Anika Agrawal. Took 7 oysters home to analyze.
- January 2024: Recorded the biodiversity of the organisms present on the oyster shells. Oyster shells are keystone species, meaning that they support many different species other than themselves.

### Education and Outreach

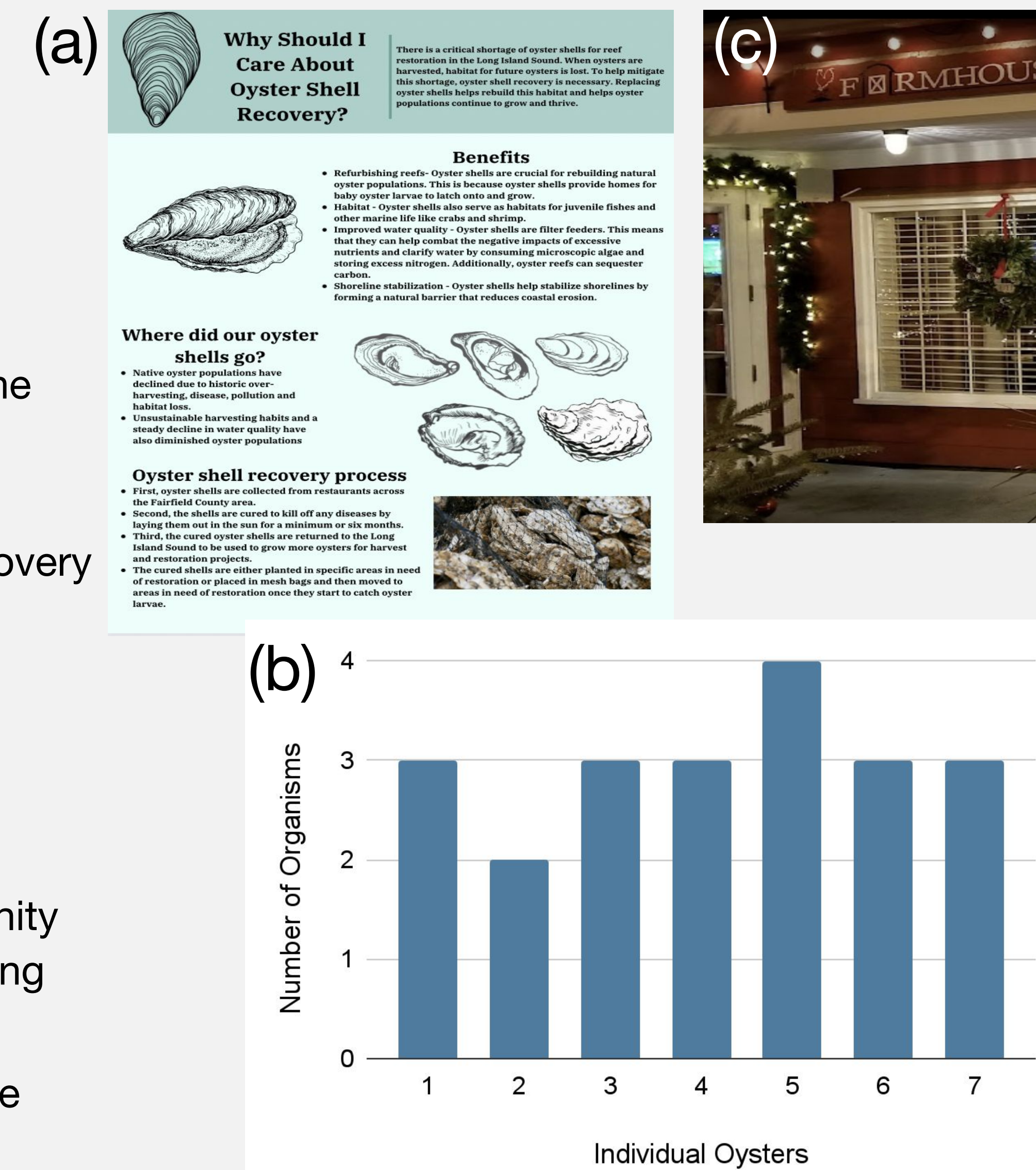
- February 2024: Created educational infographic about the importance of oyster shell recycling and restoration that includes how oyster restoration works.
- February/March 2024: Connected with 4 restaurants across Fairfield County about the importance of oyster shell restoration.

**Figure 2.** Oysters collected from oyster farm in Long Island Sound off the coast of Norwalk.. Organisms such as barnacles can be seen growing on the oysters' shells.



## Project Outcomes

- A number of diverse organisms were observed inhabiting the collected oyster shells (Fig. 3b), including:
  - Barnacles (subclass Cirripedia)
  - Bryozoans (genus *Conopeum*)
  - Sponges (class Demosponge)
  - Tunicates (subphylum Tunicata)
- These data provide evidence of oysters' importance as a keystone species in the Long Island Sound ecosystem.
- The following restaurants in Connecticut's Fairfield County were contacted and sent educational resources about oyster shell recovery (Fig. 3a) via email:
  - Whitlock's Restaurant (Bethel)
  - Farmhouse Restaurant (Newtown, Fig. 3c)
  - Old Post Tavern (Fairfield, Fig. 3d)
  - Barn Door Cafe (Ridgefield)
- This project assisted oyster reef restoration efforts in my community by increasing awareness of the importance of oyster shell recycling and recovery to local restaurants that dispose of oyster shells.
- Increasing awareness will hopefully encourage and motivate more people to do their part to help Connecticut's oyster populations.
- By carrying out this project, I learned that community engagement is one of the most important parts of environmental education.

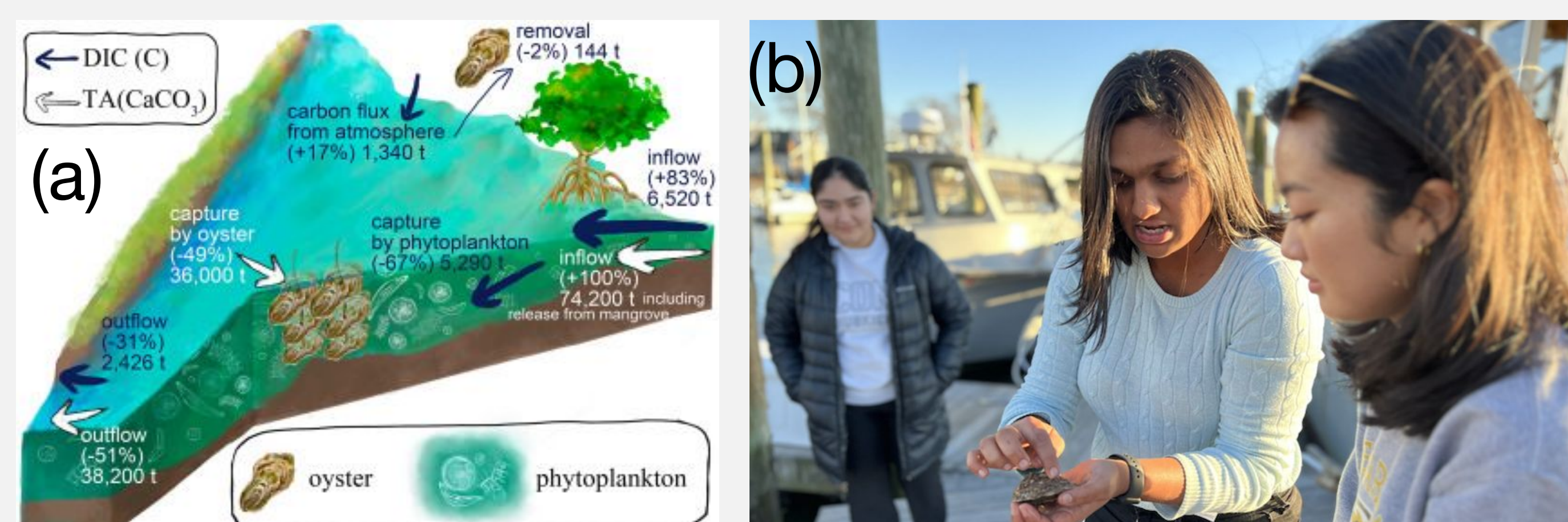


**Figure 3.** (a) Infographic about the importance of oyster shell recovery. (b) Graph showing the number of organisms inhabiting oysters collected from Long Island Sound; this is an approximate measure of species richness. (c) and (d) Restaurants educated about oyster shell recycling.

## Community Partnership

This project was completed with the help and guidance of UConn PhD student, Anika Agrawal. Her research is aimed at designing projects to understand the effects of co-occurring contaminants, mercury, and selenium in fish populations. Her knowledge about and experience with oysters inspired me to dive deeper into oyster ecology, biodiversity, and the importance of preserving oyster habitats.

Learning from Anika and exploring these topics fueled me towards similarly wanting to educate others about the importance of preserving and restoring oyster habitats.



**Figure 4.** (a) Depiction of oyster carbon sequestration process.<sup>3</sup> (b) Anika Agrawal and Katie Chan observing oysters.

## Conclusion and Next Steps

Meaningful environmental and conservation impact is not possible without the coming together of a community to ensure lasting change. For example, in this project, the goal of increasing education about the importance of oyster restoration required collaboration and connection with local several restaurants.

I hope that the research I have presented to the restaurants interests them enough to want to recycle their oyster shells. As this project moves forward, I would like to continue communicating with the restaurants that are excited to explore oyster shell recycling, and I look forward to connecting them with facilities such as the Collective Oyster Recycling & Restoration site in Southport, CT. My hope is that this project becomes continual.

## Acknowledgements and References

I would like to thank Alexandra Blas for her guidance and help throughout this project. This project would not have been possible without her constant support. I would also like to thank Anika Agrawal for teaching and informing me about the many purposes and benefits oysters serve. Finally, I want to extend my thanks to those at the UConn NRCA CAP program who gave me the opportunity to complete this program, including Dr. Laura Cisneros.

### References

- Tara L. Bardar. 2019. Factors Contributing to the Success of Restored Oyster Reefs in the Choptank River of the Chesapeake Bay, Virginia. Capstone. Nova Southeastern University. Retrieved from NSUWorks. (342)
- MacKenzie, Clyde & Tamowski, Mitchell. (2019). Large Shifts in Commercial Landings of Estuarine and Bay Bivalve Mollusks in Northeastern United States after 1980 with Assessment of Causes. Marine Fisheries Review. 80, 1-28. 10.7755/MFR.80.1.1.
- Keisuke Nakayama, Yuki Kawahara, Yuki Kurimoto, Kazufumi Tada, Hao-Chi Lin, Meng-Chi Hung, Mei-Li Hsueh, Jeng-Wei Tsai, Effects of oyster aquaculture on carbon capture and removal in a tropical mangrove lagoon in southwestern Taiwan, Science of The Total Environment, Volume 838, Part 3, 2022