

Unit 5: Sustainability

Aquarium Science

12 Classes

Rev. September 2023

Essential Questions

- What impact does the aquarium industry have on the natural ecosystem?
- How can the aquarium industry become more sustainable?

Enduring Understandings with Unit Goals

EU 1: The aquarium industry has a variety of impacts on the natural environment

EU 2: New technology and continuing knowledge of caring for aquatic organisms can limit the negative impacts on the natural environment and create an industry that can become sustainable.

Standards

Common Core State Standards

- **CCSS.ELA-LITERACY.RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts.
- **CCSS.ELA-LITERACY.RST.6-8.3** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- **CCSS.ELA-LITERACY.RST.6-8.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

Next Generation Science Standards

- **MS-ESS3-5 Earth and Human Activity** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community

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Unit Content Overview

- Conservation
 - Role of Aquarium Science in Conservation
 - Coral Farms and restoration
 - Breeding
 - Invasive species
- Commercial Fishing
 - Collection of organisms
 - Ethics of the industry
 - Aquariums on a large scale
 - How fish are packaged and shipped
- Future of the Industry
 - Future hopes for the industry
 - Sustainability
 - Aquaponics

Learning Objectives with *TWPS*

Students will be able to...

- Connect the aquarium industry to environmental impacts in natural ecosystems.**
 - *How can the aquarium industry impact natural ecosystems?*
- Investigate how organisms are collected in the wild and infer how this impacts populations.
 - *How can the collection of organisms impact wild populations?*
- Predict what the aquarium industry will look like in 20 years.
 - *How do you think the aquarium industry will change in the future?*
- Develop a logical argument to explain the necessity of captive organisms for conservation purposes.
 - *Why is it important to keep organisms in captivity?*
- Explain how breeding organisms in captivity can improve wild populations.
 - *Why is it important to breed organisms in captivity?*
- Cite evidence to explain how humans have caused species to become invasive as a result of the aquarium hobby.
 - *What is an invasive species and how does a species “invade” an area?*
- Investigate the ethics of keeping aquatic organisms within captivity.
 - *What are some ethical concerns of caring for organisms in captivity?*
- Design a package to ship live animals in varying conditions.
 - *How can you design a package to support aquatic animals for delivery?*
- Explain how the industry could become more sustainable over time.
 - *How can the aquarium industry become more sustainable?*
- Explain how aquaponics can help both fish populations and people.
 - *How can aquaponics be helpful to people and fish?*

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Instructional Strategies/Differentiated Instruction

- Daily Warm Up Activities
- Power Point Lecture with guided note-taking
- Flexible grouping
- Exit slips
- Graphic Organizers
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Student use of headphones
- Independent reading
- Outlining of text
- Determining central ideas, paraphrasing
- Laboratory Experiences

EL Differentiated Instruction:

- Sentence starters
- Simplified directions
- Prompting and questioning
- Alternate responses when needed
- Explicit modeling
- Key vocabulary
- Visuals
- Graphic organizers
- KWL charts
- Venn diagram
- Glossary

Assessments

FORMATIVE ASSESSMENTS:

- Warm Up Activities
- Daily check-ins with students
- pH water quality check (weekly)
- Temperature and Salinity tests (daily)
- Nitrate, Nitrite, and Ammonia parameter checks (weekly)
- Homework/Reading checks
- Aquarium Audit (Record Keeping Logs)- ISAAC Teamwork Rubric 3
- Quarantine Procedure Discussion

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SUMMATIVE ASSESSMENTS:

- Quiz on EU 1 & 2
- Unit Exam
- Project Save Nemo performance task - ISAAC Rubric 1 Literacy

Unit Task

Unit Task Name: Project Save Nemo

Description: Students will choose an environmental issue of their choice to research (EU1). Students will create an advertisement to spread awareness of the issue. Each student must highlight at least one sustainable practice to convince their audience they should invest in to help improve the sustainability of the industry (EU2).

Evaluation: ISAAC Rubric 1: Literacy

Unit Resources

- Laptop
- Internet Access
- Aquarium Science Lab