



Connecting Concepts

Local Youth Relate Water Quality and Macroinvertebrate Biodiversity in a Hands-On Lab

Dr. Katherine Clements, Sarah Davis,
Michael D'Imperio, Jackie Leboutitz
UF/IFAS Extension Sarasota County

EXTENSION...

- Is a **partnership** between Sarasota County, the University of Florida, and the U.S. Dept. of Agriculture
- Uses university research and resources to address local needs through community initiatives, classes, outreach, and volunteer opportunities
- Provides practical education to help residents, professionals, decision-makers and others build a better future



LIFE: LEARNING IN FLORIDA'S ENVIRONMENT

- Started in 2004, Apalachicola, FL. Original *LIFE* program was developed in partnership between Florida Department of Environmental Protection and Franklin County Schools.
- Sarasota County's *LIFE* program is coordinated by UF/IFAS Extension Sarasota County in partnership with Florida State Parks, Sarasota County Parks, and Sarasota County Schools.



4-H Youth Development

The 4-H Youth Development Program provides educational experiences through a "learn by doing" approach!

Youth acquire knowledge, develop life skills, and form attitudes to enable them to become self-directed, productive, and contributing members of society. Programs include clubs, camps, school programs and more.



LIFE: LEARNING IN FLORIDA'S ENVIRONMENT

Students become wildlife biologists, ornithologists, entomologists, marine scientists, and horticulturalists for the day!

- Immersive hands-on environmental education for 4th and 5th grade students
 - 3 key ecosystems throughout the year (Freshwater, Uplands, Coastal)
 - Student in-class preparation before each field experience
 - 3 standards-based field lab experiences at each key ecosystem



WATER QUALITY AND BIODIVERSITY LAB

OBJECTIVES

- Introduce students to the concepts of water quality and the use of scientific equipment by measuring several parameters and relating measured values to macroinvertebrate biodiversity observed in real-time at Lake Osprey in Oscar Scherer State Park
- Expand pathways to future careers in the Natural Sciences by engaging students in thoughtful play as Limnologists, Chemists, and Ecologists.
- Provide a hands-on educational experience that supports State educational standards for science in grades 4 and 5.



WATER QUALITY AND BIODIVERSITY LAB

METHODS

- Initial in-class preparatory lesson to introduce students to concepts including biodiversity, water quality, and the types of equipment that they will be using in the field.
- Field lessons took place at Lake Osprey in Oscar Scherer State Park.
- Prior to the lesson, macroinvertebrates were collected via dipnet and held in covered bins. Water was collected from Lake Osprey in a large plastic container.
- Lesson began with a review of pH, temperature, and dissolved oxygen with particular focus on ecological importance of each parameter.
- Students were split into 3 groups.
- All students would watch as group 1 approached the plastic container and took turns taking pH readings with a handheld pH meter. All students recorded the average pH on data sheets.
 - Process repeated with group 2 approaching to measure temperature (°C) with handheld thermometer.
 - Process repeated with group 3 approaching to measure dissolved oxygen (mg/L) with handheld DO meter.
- Students engaged in group discussion about relationship between water quality parameters and biodiversity. Students were asked to develop hypothesis: "expect to observe high/low biodiversity".
- Invertebrate bins were uncovered and students were given time to count type and number of macroinvertebrates
- Students reported observed number of macroinvertebrates in relation to their hypotheses.

PREPARATORY LESSON

Water Quality

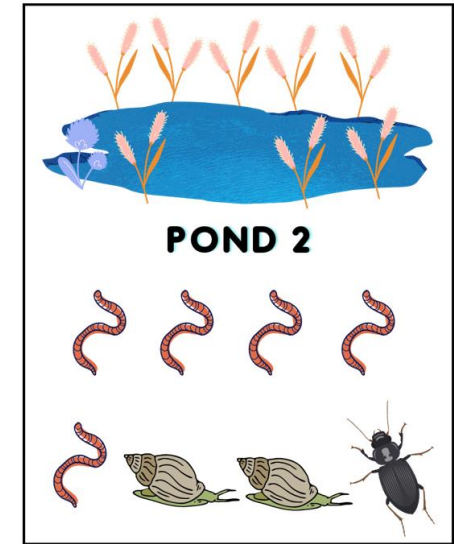
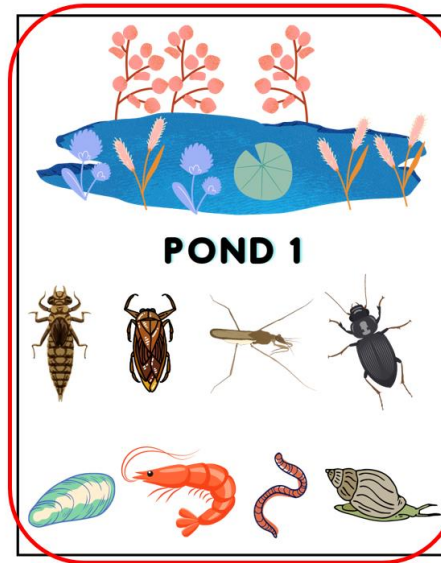


Parameter: a measurable feature of water that can be used to determine its quality or "health"

Types of parameters:

- Chemical
 - pH
 - DO
- Physical
 - Turbidity/water clarity
- Biological
 - Macroinvertebrates

Which pond has higher biodiversity?



PREPARATORY LESSON

FIELD EQUIPMENT:

PH/TEMPERATURE

PROBE



DO METER



DIP NET



1. Dip the net into the water, flat side down.
2. Move it back and forth along the bottom of the water at least 5 times.
3. Push the netting into a container of water.
4. Clean out your net when you're done!

DATA SHEETS

Group # _____
Water Quality Data

Chemical

pH: _____

Dissolved Oxygen (DO): _____

Physical

Temperature: _____

Hypothesis

Considering what we learned about water quality, I hypothesize that there will be

Circle one:

0-3 (low)

4+ (high)

different kinds of macroinvertebrates found living in the water.

Biological

Aquatic Macroinvertebrates



Snail



Clam



Mussel



Bug



Beetle



Dragonfly



Fishing Spider



Caddisfly



Mayfly



Stonefly



Dragonfly



Beetle



Midge



Mosquito



Amphipod



Crayfish

Crustaceans

Other



Other

HYPOTHESES

Students worked through the scientific method by making observations, developing hypotheses, testing their theories, and reporting their findings.

All student groups hypothesized that a "high" level of biodiversity would be observed among collected macroinvertebrates.

When asked to justify their hypotheses, students demonstrated the ability to rationalize decision based on what they learned about pH, temperature, and dissolved oxygen.

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IMPACTS AND OUTCOMES

LIFE Uplands module 2023: Oscar Scherer State Park

- 249 4th and 5th grade students from 3 schools participated in a 1-hour in-class session and a 3-hr field experience
- Labs included: Wildlife adaptations, Plant reproduction, and Water quality and biodiversity
- 66.4% average pre-test score (n=237) compared to average 88% post-test score (n=249) for a total knowledge gain of 32.5%
- 72% of students indicated first time visit to Oscar Scherer State Park

Water Quality and Biodiversity Lab

- 70% pre-test increased to 91% = **30% knowledge gain** (defining biodiversity)
- 54% pre-test increased to 94% = **74% knowledge gain** (acids vs bases on pH scale)
- 31% pre-test increased to 64% = **106% knowledge gain** (temperature's effect on DO)
- Similar average increase in knowledge gain between 4th and 5th grade students

TAKE HOME MESSAGE

- Students not only showed measurable knowledge gain but demonstrated critical thinking by connecting the concepts of water quality and biodiversity.
- New career possibilities were introduced, along with hands-on experience practicing skills and tools commonly used in the field of Natural Resources.
- 72% of students reported having a new life experience by visiting Oscar Sherer State Park.
- Students enjoyed a fun, educational experience while connecting with the outdoors.



UF/IFAS Extension Sarasota County



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QUESTIONS?



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