



SHORELINE RESTORATION INDOOR LAB LESSON PLAN

Subject area: Shoreline Maintenance and Restoration

Grade level: Middle School

Seasonal timing: Spring before outdoor field trip

Instructional time: 45 minutes

- A. Learning Goal:** Learners will be able to understand the importance of buffer zones to maintaining the water quality and functioning of lake ecosystems. They will explore the various elements that are critical to a stable shoreline and methods to prevent erosion.
- B. Objectives:**
- Understand key terms and concepts essential to assess the stability of shorelines.
 - Determine factors that may contribute to runoff and erosion on shoreline habitat and the impact on water quality and lake ecosystems.
 - Develop a shoreline restoration project plan.
 - Discuss how land use can impact erosion and alter water resources.
- C. State Standards:**
- SCI.CC7.m – Students explain stability and change in natural or designed systems by examining changes over time and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
 - SCI.LS2.C.m – Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health.
 - SCI.LS2.D.m – Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on — for example, water purification and recycling.
 - SCI.LS4.D.m – Changes in biodiversity can influence humans’ resources and ecosystem services they rely on.
 - SCI.ESS3.C.m – Human activities have altered the hydrosphere, atmosphere, and lithosphere which in turn has altered the biosphere. Changes to the biosphere can have different impacts for different living things. Activities and technologies can be engineered to reduce people’s impacts on Earth.
- D. Setting:** Indoor classroom.

E. Materials and Resources: Students divided into small groups of 3-5

- Topographical map of local lake (Bony Lake is provided in lab packet).
- Student lab packets.
- Marker packets with blue, yellow, red and black (1 per group).
- Variety of local soil samples (i.e., sand, clay, loam).
- Relevant PowerPoint slideshow led by local expert, if available.

F. General delivery, see teacher guide for detailed implementation suggestions:

Introduction of Lesson

- Review lake zone terms:
 - Littoral zone – where rooted plants might grow.
 - Limnetic zone – deeper area of lake.
- Discuss how shoreline erosion can influence native plants and water quality.
- Introduce key concepts when determining shoreline restoration plans: soil type, slope, shade, existing vegetation, and human activity.
- Use examples to highlight shoreline restoration concepts about where to build, where to develop paths and what types of vegetation could help maintain shoreline.

Large Group:

Go over map, introductory materials and hand out equipment and break up into small groups.

Small Group:

Each small group goes to a desk station. Each group will complete the enclosed lab sheet using the map and markers.

G. Assessment:

Each group will report their findings and present their shoreline development plans.