LESSON TITLE: Lesson 8 Sustaining Biodiversity: An Ecosystem Management GRADE: 9-12

Amount of Preparation Needed Prior to Class: 5-10 Minutes, 10-15 for Activity/Lab

Learning/Lesson Plan

NGSS Standard(s):

- FHS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
- HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
- HSS.IC.B.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
- HSS.IC.B.6. Evaluate reports based on data.

AP Environmental Science Standard(s):

- ERT-1.A.3: Competition can occur within or between species in an ecosystem where there are limited resources. Resource partitioning—using the resources in different ways, places, or at different times—can reduce the negative impact of competition on survival.
- STB-1.G: Describe methods for mitigating human impact on forests.
- EIN-2.A.1: The tragedy of the commons suggests that individuals will use shared resources in their own self-interest rather than in keeping with the common good, thereby depleting the resources.
- EIN-2.B.2: Forests contain trees that absorb pollutants and store carbon dioxide. The cutting and burning of trees releases carbon dioxide and contributes to climate change
- EIN-2.B: Describe the effect of clearcutting on forest
- STB-1.A: Explain the concept of sustainability

Objective(s)

Students will...

1) Identify examples of ecosystem and economic services forests provide.
2) Describe ways scientists classify forests based on their age and structure.
3) Identify various methods of harvesting timber and their impacts on forests and explain how deforestation impacts forests.
4) Describe management solutions that help reduce impacts of timber harvesting, fires, and deforestations.
5) Identify ecosystem services provided by grasslands.
6) Define rangelands and pastures and explain how overgrazing impacts these areas.
7) Describe methods for managing rangelands that limit impacts of overgrazing and help preserve grassland habitat.

8) Identify challenges of managing national parks and other protected lands, especially in less-developed countries.
9) Explain factors that place stress on U.S. national parks.
10) Understand how buffer zones can make it easier to sustainably manage reserves.
11) Explain how wilderness areas are managed to protect wild species and ecosystems.
12) Identify the steps to sustaining terrestrial biodiversity using an ecosystem approach.
13) Define biodiversity hotspots and explain their importance.
14) Understand the importance of protecting ecosystem services and human communities that depend on these services.

Essential Questions:

1) How can forest, grasslands and protected lands be better managed?
2) How can we protect aquatic biodiversity?
3) How Does the Ecosystem Approach Help Protect Terrestrial Biodiversity?
4) How Does the Ecosystem Approach Help Protect Aquatic Biodiversity?

Assessments Summative and Formative
(What strategies will be employed? How will we know instruction has been successful?)

Students will demonstrate summative and formative understanding of content by:

1) Use Bell Ringers to review and front-load content before day's lesson
2) Use activities to guide understanding of content and prepare for lesson
3) Use Unit 8 lab to help students understand survivorship by collecting, interpreting and graphing data.
4) Use Unit 8.3 Secondary Source to analyze the cause and effect of deforestation.
5) Use Mini Quizzes and Lesson Assessment

Materials Needed

- **WS/handout**
- **Computer Lab or Laptop/tablet**
- **Projector/Smartboard**
- **Internet**
- **Lab materials**
- **Beach Ball**

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Setting the Stage/Beginning the Lesson/Engagement*
(How will new learning be introduced? How will students get motivated/excited regarding new learning? How will prior knowledge be tapped and assessed?)

Day 1: Presentation tips: Review presentations prior to doing them for the first time. Add your own personal connections to them. Bring your enthusiasm. Your enthusiasm (or lack of) will translate to your students' enthusiasm for the content.

Present **Bell Ringer Slide 2** for five mins group discussion. Move to Unit 8.1 PPT presentation and guided lecture notes. EdPuzzle link for Bell Ringer Video Clip: Edpuzzle

Day 2
A. Bell Ringer: Google form: short answer on the progress of the Green Belt Movement.
https://docs.google.com/forms/u/1/d/12RM5BgH-uhBBX8aXiux9S-oS3hzm44_bDwb1rhtUw7w/copy

You will need to be logged into your google account to create a copy of this form. If you do not want to use this form complete the activity using the PDF file (print and handout). Next, Hold mini class discussion of students' responses from google form bell ringer

Day 3: Bell Ringer: Beach Ball Review 8.1-8.3 vocabulary. Recap the challenges of the forest and suggest solutions to the question: ***"how can forests be better managed?"***

Day 4: (Computer Lab Most Ideal) Bell Ringer: **Lesson 8.4 Bellringer Activity**. 2) Mini discussion: How can forests be better managed?

Day 5: Bell Ringer: Beach Ball Review of Lesson all key terms using the Quizlet Live.

Day 6: Bell Ringer: Group discussion: how can we improve the condition of our forest and oceans? Ask for volunteers to share **ES Unit 8.3 Protecting National Parks Activity**

Day 7: Begin the Lesson 8 Test Review

Day 8 : Students will prepare to take the test.

Acquisition of Skills/Developing the Lesson/Exploration*/Explanation*/ Elaboration*
(What will Modeling, Guided Practice, Independent Practice, and Checking for Understanding look like?)

Day 1: After class discussion of the bell ringer present move to Unit 8.1 PPT presentation and guided lecture notes. Next, have students complete **4Column Key Terms WS for Lesson 8.1-8.2.** This assignment helps students apply other methods of learning key terms in preparation for content in **Lesson 8.1 PPT presentation.**

Day 2 *Gradual release format (I do-notes -we do- google form discussion, you do-google form):* The teacher will present the **8.2 section of the Lesson 8 PPT** and students will complete their guided lecture notes.

Day 3 (Incorporating Secondary Documents): The teacher will present the **8.3 section of the Lesson 8 PPT** and students will complete their guided lecture notes. Students will then complete the reading of the **International Union for Conservation of Nature** to learn about deforestation and land management.

Day 4: (Computer Lab or iPad Cart Needed): The teacher will present the 8.4 section of the **Lesson 8 PPT** and students will complete their guided lecture notes. Students will then begin the **ES Lesson 8.4: Ecosystem Approach and Terrestrial Biodiversity Webquest**. The teacher will show student how to identify reliable sources of information.

Day 5: The teacher will present the **8.5 section of the Lesson 8 PPT** and students will complete their guided lecture notes. Students can finish the Webquest from day 4 if they did not have time then.

Day 6: **Lesson 8 Key Term Vocab Quiz-** You may choose to do this as the bell ringer or exit if you feel as though you will be short on time for the lab. It is a good idea to allow student ample time to work in the lab so they do not have to store materials.

ES Lesson 8 Lab- the teacher can decide whole class instruction, group, pair, or individual. Pacing Guide: depending on student level, you may need two 50 min class periods to complete.

Day 7: Students will complete the **Lesson 8 test review**.

Day 8: Assessment

Closing the Lesson/Summary of Learning/Evaluation*
(How will learning be explained, summarized, applied to assure student understanding?)

Day 1: Students will complete 4Column Lesson 8.1 handout as exit ticket.

Day 2: Students will complete 8.1-8.2 Vocab Quiz. You can use the quiz that is on linked on our website or you can create your own using the Quizlet: Here is a video on how to do that: https://youtu.be/sdk_xu-Qy80

Day 3: Students will complete Exit Ticket: **ES Lesson 8.3 Protecting National Parks Activity**

Day 4: Students will complete **4Column Vocabulary Chart 8.4-8.5**

Day 5: Students will complete **ES Lesson 8.5 Exit Protecting Aquatic Biodiversity.** Students can do this independently or as a think-pair-share. Give them an opportunity to write down their ideas first. End with a full class discussion.

Day 6: Finish and clean up and discuss the results of the **ES Lesson 8 Lab Report.** If students require a second day for lab have them get to a good stopping point in their lab.

Day 7: Go over the test review.
Optional Extension Activity: **ES Lesson 8: The Rainforest, Ecosystem, and Us Activity**

Day 8 -Assessment-Preview key terms from the next lesson.

Differentiating the Lesson
Differentiations will be based on students' needs

Higher Differentiation – The teacher can provide materials for independent practice for the following activity(ie):
8.4: Ecosystem Approach and Terrestrial Biodiversity Webquest, ES Lesson 8 Lab and Lab report, and incorporating Secondary Documents: actively read and discuss the article from International Union for Conservation of Nature to learn about deforestation and land management.

Lower Differentiation-teachers should consider whole class instruction to ensure students are properly inputting data and plotting the points correctly to create graphs for the following activity(ie):
ES Lesson 8 Lab and Lab report

8.4: Ecosystem Approach and Terrestrial Biodiversity Webquest- teacher should continually circulate room/lab to ensure students understand research techniques and avoid off task distractions.

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Learning/Lesson Reflection (What went well? What may need revision the next time I use this lesson? How did students react? etc.)
Learning/Lesson Extension **(What web sites, references, field experiences, related topics, or activities might offer enriched or enhanced learning opportunity?)**
Extension Activity: ES Lesson 8: The Rain Forest, Ecosystem, and Us Activity