

VOLUME 44, EPISODE 4 - 13 minutes

ENVIRONMENT: *The Everglades Ecosystem*

SYNOPSIS

The unique subtropical wetland areas in southern Florida are called the Everglades. Beginning in central Florida near Orlando, the Kissimmee River flows south into Lake Okeechobee. Water then leaves the lake, and flows southward across a limestone shelf to Florida Bay at the southern end of the state.

This episode of Science Screen Report explores the Everglades ecosystems and some of its inhabitants. It explains how development of the area brought unexpected damage and discusses the plans for restoring the natural habitat and eliminating excessive chemicals and harmful invasive species.

CURRICULUM UNITS

- CHEMICAL ENGINEERING
- CHEMISTRY
- EARTH SCIENCE
- ECOLOGY
- ENVIRONMENTAL SCIENCE

CAREER POSSIBILITIES

- | | |
|---------------------------|--------------------|
| ■ BIOLOGIST | ■ ENGINEER |
| ■ CHEMIST | ■ ENVIRONMENTALIST |
| ■ CONSERVATION SPECIALIST | ■ GEOLOGIST |
| ■ EARTH SCIENTIST | ■ HYDROLOGIST |
| ■ ECOLOGIST | ■ OCEANOGRAPHER |

NEXT GENERATION SCIENCE STANDARDS & NATIONAL SCIENCE EDUCATION STANDARDS

NEXT GENERATION SCIENCE STANDARDS: www.nextgenscience.org

Earth and Human Activity; ESS3.C: Human Impacts on Earth Systems - Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.

Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Earth's Systems; ESS3.C: Human Impacts on Earth Systems - Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Grades 9 - 12

Science & Technology

Abilities of technological design
Understandings about science and technology

Grades 9 - 12

Science in Personal & Social Perspectives

Science and technology in local, national, and global challenges
Natural resources
Environmental quality
Natural and human-induced hazards

Grades 9 - 12

Life Science

Biological evolution
The interdependence of organisms
Matter, Energy and Organization in Living Systems

CRITICAL THINKING EXERCISES

1. Have students research and map the Everglades. Discuss how the Everglades formed.
2. Ask students to research factors that have altered the Kissimmee River over time by human interference. Have students discuss the status of the river today.
3. Have students diagram a food web showing the relationship of species living in the Everglades. Discuss their food web and how removing specific species from the web can impact other species.
4. Have students make a sedimentation bottle to investigate how particles of different size, shape, and textures are sorted into different layers during the processes of flooding and sedimentation.

BACKGROUND

The Florida Everglades is an extremely diverse ecosystem that hosts a wide variety of flora and fauna. The Everglades began to form about 5000 years ago when sea levels stabilized after the last ice age. Mangrove coastlines, hardwood forests, and cypress swamps began to flourish. Water covered the lower half of the state of Florida, and slowly drained into estuaries, supporting a dynamic salt water system.

But as human populations increased in Florida and the demand for farmland, timber and houses increased, the Everglades suffered many setbacks. Developers rerouted parts of the Kissimmee River eliminating thousands of acres of floodplain and marshland. In the 1940s, the state government and the Army Corp of Engineers began to fix these mistakes.

Scientists continually check the soil quality, water quantity and quality, water distribution, bottom sediments, and phosphorus levels to monitor the health of the Everglades. They also keep a close watch on plant distribution because some of the plants in the Everglades act as natural filters for excessive levels of phosphorus.

ADVANCED ORGANIZERS

Prior to viewing this video, students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press, which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 3. The Nature of Technology

Section B: Design and Systems, Grades 9-12

- Complex systems have layers of controls. Some controls operate particular parts of the system and some control other controls. Even fully automatic systems require human control at some point.

Benchmark 4. The Physical Setting

Section B: The Earth, Grades 9-12

- Climatic conditions result from latitude, altitude, and from the position of mountain ranges, oceans, and lakes. Dynamic processes such as cloud formation, ocean currents, and atmospheric circulation patterns influence climates as well.

Section C: Processes that Shape the Earth, Grades 9-12

- Plants on land and under water alter the earth's atmosphere by removing carbon dioxide from it, using the carbon to make sugars and releasing oxygen. This process is responsible for the oxygen content of the air.

Benchmark 5. The Living Environment

Section D: Interdependence of Life, Grades 9-12

- The world contains a wide diversity of physical conditions, which creates a wide variety of environments: freshwater, marine, forest, desert, grassland, mountain, and others. In any particular environment, the growth and survival of organisms depend on the physical conditions.

*Benchmarks can be found at www.project2061.org/tools/benchol/bolintro.htm

VOCABULARY

Calcareous periphyton: Communities of algae, fungus, and bacteria that grow as a thin film on rocks and plants and sometimes float along on the surface of water. It is important because it is food for other animals, creates oxygen for water, and filters out phosphorus.

Estuaries: The wide lower course of a river where it flows into the sea. Estuaries experience tidal flows and their water is a changing mixture of fresh and salt.

Everglades: A tract of low, swampy land, especially in southern Florida, characterized by clumps of tall grass and numerous branching waterways.

Forage: To search about; seek; rummage; hunt (usually for food).

Limestone: Sedimentary rock consisting mainly of calcium carbonate, deposited as the calcareous remains of marine animals. Often used as a building stone and in the manufacture of cement.

Metabolizing: The chemical processes by which cells produce the substances and energy needed to sustain life. As part of metabolism, organic compounds are broken down to provide heat and energy. Simpler molecules are also used to build more complex compounds like proteins for growth and repair of tissues.

Peat soil: A soil type that has some mineral content, formed under conditions of excess moisture from precipitation or from stagnant fresh or slowly running ground water. Peat soils are the upper portion of peat bog deposits, formed below a layer of particular types of vegetation that thrive under conditions of excess moisture.

Phosphorus: A solid, nonmetallic element (Atomic number 15) existing in at least three allotropic forms. The element is used in forming smoke screens, its compounds are used in matches and phosphate fertilizers, and it is a necessary constituent of plant and animal life in bones, nerves, and embryos.

SUGGESTED REFERENCES

- *The Everglades National Park:* www.nps.gov/ever/index.htm
- *Friends of the Everglades:* www.everglades.org
- *Comprehensive Everglades Restoration Plan (CERP):* www.evergladesplan.org
- *Florida Department of Environmental Protection; Everglades Restoration:* www.dep.state.fl.us/secretary/everglades/