

SECTION-TOPIC	GEOGRAPHY – EVERGLADES
SUNSHINE STATE STANDARD	<p>Standard 5: <i>Understand how human actions can impact the environment.</i></p> <p>SS.912.G.5.4: <i>Analyze case studies of how humans impact the diversity and productivity of ecosystems.</i></p> <p>SS.912.G.5.6: <i>Analyze case studies to predict how a change to an environmental factor can affect an ecosystem.</i></p>
VOCABULARY	Everglades, Immense, Ecosystem, Extensive, Abundant, Drainage, Devastating, Agriculture, Levees, Canal, Endangered
REQUIRED MATERIALS	Vocabulary, <i>The Everglades Reading</i>, Cause and Effect Worksheet
DURATION	1 – 50 minute period

DO NOW OR PRE-READING –

- Students will spend 5-10 minutes doing a **Vocabulary Brainstorming Activity**.
- Teacher will post the lesson vocabulary words on the board.
- Students will write the words on their paper and follow each word with a definition and example.
- After completing the activity, students must write the percentage at which they feel confident they are right.
 - 0% - they have never heard the word before
 - 25% - they have heard the word but are not sure of its use
 - 50% - they think they know the definition but are not confident
 - 75% - they know the word and are most confident they have the meaning
 - 100% - they know the word and the definition.

LESSON –

- Teacher will make copies or project the following reading on the white board, ***The Everglades***.
- Students will go through the reading individually and complete the **Cause and Effect Worksheet**.
- The worksheet consists of a cause and effect side. Some causes and some effects from the reading are listed on the worksheet.
- Students must find the missing causes and effects and insert them into the empty boxes.

The Everglades

Florida's "mother swamp," the Everglades, is an immense, shallowly flooded region, where countless minor hills become islands. While part of the south Florida ecosystem has ancient limestone as its foundation, the Everglades, formed only during the past 5,000 years, as sea levels rose from the lows of the Ice Age to present levels. Its slow-moving waters allow dense mats of algae to grow, which form the basis of an extensive food web. Like on a coral reef, the presence of so many tiny organisms attracts small animals, which in turn attract larger animals. Seemingly endless fields of sawgrass provide shelter and nesting sites for snakes, alligators, turtles, birds, panthers—and mosquitoes.

This abundance of life, although still remarkable, is not what it was in 1896, when Mary E. Woodward described a boat trip on the Upper Miami River: ¹

Everything was quietness and repose, broken only by the cry and flight of many large water birds. The river wound around among the trees, deeply bordered with water plants and tall grasses, until we saw before us an ocean of grass, as far as the eye could reach: rising out of it here and there clumps of mangrove and islands of pines. I am told that after penetrating the Everglades ten or fifteen miles, there remains only a grassy sea, broken occasionally by a plant or shrub peculiar to the region, and although small, showing above the grass for a long distance. The water is deep and clear as crystal, seeming like air as we looked down on it when unrippled.

Although it is not visible in Woodward's account, alteration of the Everglades' natural ecosystem by humans had already begun in 1847, two years after Florida was granted statehood. From the late 1800s into the early 1900s, knowledge and technology greatly increased in the field of drainage engineering. ² Governor Napoleon Bonaparte Broward used this progress in 1907 to begin a state effort to reclaim the wetlands under an Everglades Drainage District.

Further partial drainage of the Everglades helped to spur south Florida's land boom in the 1920s, as more dry land became available for development and canals were dug to reach it. When the boom turned to bust in 1929, in part because of devastating hurricanes in 1926 and 1928, all drainage activity in south Florida was stopped. By then about 400 miles of canals had been constructed.

Construction of the Herbert Hoover Dike began in 1938, inspiring confidence that the Glades were safe from further flooding. After a pause for disastrous floods in 1947 and 1948, activity resumed and led to creation of the Central and Southern Florida Project for Flood Control and Other Purposes. At the same time, 700,000 acres of wetlands south of Lake Okeechobee were designated for draining as the Everglades Agricultural Area. The rest was cut up by a maze of highways, canals, levees, and dams that completely changed the water's natural flow. A 100-mile levee separated the

¹ "A Day's Pleasure," The Lake Worth Historian (1896).

² Strickland, Jeffery Glenn. The origins of Everglades drainage in the Progressive Era: Local, state and federal cooperation and conflict. Thesis (M.A.), Florida Atlantic University, Vol. 37-04 (Masters Abstracts International, 1999), 1112.

Everglades from urban development, effectively eliminating 160 square miles of Everglades east of the levee that had reached all the way to the Atlantic Coastal Ridge.

Making Florida a civilized place to live was hard work for early settlers as well as those who built on their foundation, but the toll on nature was also heavy. By far the most damage has been done to the Everglades, because people saw it as an obstacle to progress.

Human Interaction

By 1996, in comparison with the earliest available estimates of the ecosystem and its components, populations of wading birds declined by 85 to 95%; sixty-eight plant and animal species were threatened or endangered; over 1.5 million acres were infested with invasive, exotic plants; and one million acres were contaminated with mercury.

Because water flows through the Everglades differently than it once did, some areas do not receive enough water, and others receive too much. One of the major habitat types in the Everglades originally consisted of dense sawgrass ridges interspersed with relatively open sloughs that collected water, in an organized pattern, parallel to the flow direction and on a slight decline. Water management is transforming this habitat into a more uniform landscape, with detrimental effects on the Everglades' plants and animals. Restoration efforts focus on re-establishing more natural patterns of flow, which is closely connected to water levels.

For a long time, the sugar farms of the Everglades Agricultural Area have returned polluted flood and irrigation water to Lake Okeechobee to prevent sugarcane from drowning. Excessive phosphorus from fertilizer and animal waste from the dairy, citrus, and ranching industries has also been carried by rainwater into rivers and swamps. Phosphorus-loving cattail appeared at the expense of the sawgrass, changing the underwater ecosystem and affecting animal habitats on land.

As early as the 1920s, private citizens called attention to the degradation of the Everglades. In 1929 botanist John K. Small's *From Eden to Sahara: Florida's Tragedy* chronicled the "fast and furious" destruction of the Everglades and advised, "It is not too late to act." Marjorie Stoneman Douglas agreed, and for many people, the identity of the Everglades is in her eloquent immortalization of the slow movement from north to south of a 35-mile-wide expanse of water across the vast landscape. Douglas' classic book, *The Everglades: River of Grass*, was published in 1947, the same year Everglades National Park was dedicated, and 100 years after humans decided to "reclaim" the Everglades.

In 2000 the State of Florida and the federal government launched the historic multibillion-dollar Comprehensive Everglades Restoration Plan (CERP), the largest initiative of its kind. The 2008 mandated biennial review of the plan by the National Research Council reported that only "scant progress" had been made and no projects had been completed, due to management issues. Continued decline of ecosystems, increasing costs and population, and a changing climate were named as challenges contributing to the urgency for Everglades restoration.³

³ Committee on Independent Scientific Review of Everglades Restoration Progress, *Progress Toward Restoring the Everglades: The Second Biennial Review*, Executive Summary (National Academy of Sciences, 2008), at <http://www.nap.edu.catalog/12469.html>.

All the news is not bad. Programs and laws have been put into place. Some lands are even being returned to swamp to restore the delicate ecological balance of the Everglades. Portions of the Everglades, once seen as wasteland, are now on protected land, including several wetlands under the protection of the Palm Beach County Department of Environmental Resources Management. The Arthur R. Marshall Loxahatchee National Wildlife Refuge contains 221 square miles of the Everglades, where over 250 species of birds are known to visit each year.

ASSESSMENT/EVALUATION -

- Following the reading and completion of the **Cause and Effect Worksheet (see attached)**, students will complete the **Analysis Questions** on the bottom of the worksheet.
- Teacher may discuss the reading prior to students completing the question
- Students will turn in the **Cause and Effect Worksheet** as well as their answer to the **Analysis Questions** before the end of the period.

CAUSE AND EFFECT WORKSHEET

CAUSE	EFFECT
Sea levels rose following the Little Ice Age 5,000 years ago.	The Everglades were formed
In the late 1800s and early 1900s, technology and knowledge in the field of draining engineering increased.	
	Land became available for the 1920s Florida Land Boom
	All drainage activity was stopped in 1929.
Due to canals, water flows differently through the Everglades than it once did.	
	Phosphorus-loving cattail appeared at the expense of the sawgrass, changing the underwater ecosystem and affecting animal habitats on land.
Some lands are even being returned to swamp to restore the delicate ecological balance of the Everglades.	

Analysis Question – Answer the following questions below using your prior knowledge and the Everglades reading.

1. **Evaluate** from the reading the situation of the Everglades today as **compared** to the description put forth by Mary E. Woodward in 1896. **Site** some **similarities** as well as some **differences**.
2. In addition, **express** your opinion about the Everglades. Should money be spent to restore the ecological balance or should the Everglades be drained to accommodate a growing Florida population?