The Growth of Florida’s Canals

Introduction:
This unit of study has two major objectives. One is to look at the spread of canals in south Florida, and the second is to use several geography methods of study including spatial interaction and “diffusion.” Spatial interaction analyzes the relationships of cultural and physical phenomenon (in this case found in canals) in space. Diffusion is the movement of a phenomenon over space through time. We are trying to gain a general understanding of the building of canals in southwest Florida, why they were built, when they were built and what they have been used for. We also want to look at the effects the building of these canals has had on the cultural and physical environment. This spatial analysis of canals of South Florida makes this a study in Geography.

Grade Level: upper elementary/middle school

Time: 1-2 class periods

Selected Concepts:  canal  
wetlands  
Everglades  
“River of Grass”  
Florida Bay  
Land Drawings  
Irrigation  
Diffusion  
Flood Control  
South Florida Water Management District

Objectives:  
Cognitive:  
To understand:
1. what a canal is.  
2. various characteristics of South Florida canals.  
3. why the canals were built.  
4. the spread of canals in Southeast Florida.  
5. that this spread of a feature (canals) over the landscape through time is called diffusion.  
6. some of the positive impacts of canals on South Florida.  
7. some of the negative impacts of canals on South Florida.  
8. the efforts of Florida officials to lessen some of the negative impacts of canals on South Florida.  
9. the geographic method called spatial interaction.

Psychomotor  
Be able to:
1. read a map that shows the spread of canals in South Florida through time.  
2. rse a map to show positive impacts of canals on South Florida.  
3. rse a map to show negative impacts of canals on South Florida.
4. draw a generalized map of South Florida that shows populated areas, agricultural areas, water conservation areas and the Everglades.

**Affective**

To appreciate:
1. the character of the undisturbed natural environment of historical South Florida.
2. the historical character of the “River of Grass.”
3. the value of applying technology to the natural environment to protect human life.
4. the efforts of the water management agencies in South Florida to balance the needs of people and the natural environment.
5. the use of the geography study method “diffusion.”
6. the use of the geography study method “spatial interaction.”
7. the difficulties encountered when using mutually exclusive objectives such as: water quality, flood control, multi-use of water, storage, and preservation of wildlife habitat.

**Content:** *(This lesson uses the Florida’s Canals Map found in the Blackline Masters. You may want to review this map when reading the following background information.)*

- A canal is generally considered to be a man-made waterway or artificially improved river having various uses such as irrigation, shipping, recreation or flood control.
- When Florida became a state in 1845, much of the land, which was low in elevation, was wetland. Wetlands were considered unusable and a barrier to development of highways, railroads, and agriculture. Therefore, one of the first efforts of Florida’s early leaders was to drain the land of the water or fill it in so that the land could be used profitably.
- In the 1880’s, a Philadelphia businessman by the name of Hamilton Disston bought four million acres of wetland from the state for one million dollars. He began very early to dig canals to drain this land and dig a channel in the Caloosahatchee River and the Kissimmee River basin.
- Napoleon Bonaparte Broward, the governor of Florida in 1904 was elected on the promise to “drain the Everglades.”
- Digging channels in the rivers and draining wetlands were called, at that time, “reclaiming land” or, “making land improvements.”
- In the early history of Florida all land drainage was done without any consideration of the effects it would have on the physical environment including the modification of groundwater tables, the destruction of wildlife habitat, and the change in salinity at the receiving waters of the Atlantic or the Gulf of Mexico, including Florida Bay.
- About 1920, canals were dug to drain the water at the southern end of Lake Okeechobee and connect the lake with the Caloosahatchee River. As seen on the 1920 map, most of this water was emptied into the Atlantic Ocean.
- By 1930, canals and the channelization of the Caloosahatchee and St. Lucie Rivers allowed the barge transportation of goods between the east and the west coasts. Additional canals were built to provide drainage from Lake Okeechobee, which, by this time had had a five-foot high dike constructed along the southern perimeter of the lake.
- The dike, built during the 1920’s at the southern end of the lake, was constructed because several hurricanes had caused flooding which drowned hundreds of people in the Moore Haven and south lake area. Finally in 1928, a very large hurricane with winds from the north blew water out over the southern end of the lake and more than 2,000 people lost their lives. As a consequence of that hurricane, and 85-mile long dike was built, which
over the years has been elevated 34 to 38 feet above the land and more than 20 feet above the mean level of the lake.

- As people moved into the area of southeast Florida during the 1930s canals were widened and deepened for flood control and to create more dry land primarily for agriculture. During the early 1930s a canal was dug as shown on the map from Collier County to Dade County. This allowed the building of the Tamiami Trail, which became the first east-west road between the southern Gulf coast of Florida and the Atlantic coastline.
- The Caloosahatchee, Lake Okeechobee, St. Lucie River barge canal had been deepened and widened through the 1950s and continues to be an important waterway today for both commercial and recreational traffic.
- Several problems became noticeable during the 1950s, which caused people to question whether all the digging of canals had been a wise thing to do. The first problem was the changing of the water flow from Lake Okeechobee south through the Everglades into Florida Bay. This Everglades region needed constant water to supply the grasses that grew there. This area was made famous by Marjorie Stoneman Douglas’ book, “River of Grass”.
- By the 1960s, what had been called “land improvement or reclamation” was now called by many people “environmental destruction”.
- The Everglades was a very wet, grass area, with low mounds called hammocks a few feet above the water table on which much wildlife lived and numerous trees grew. The water moved through the river of grass and filtered into Florida Bay, which provided a nursery and a very rich habitat for marine life.
- By the 1970s the flow of the water into Florida Bay had been so modified (reduced) that much of the marine life that had used that habitat for a nursery began to disappear.
- The decrease in water flow through the Everglades also harmed the environmental health of the 10,000 Islands Coast of Southwest Florida.
- A second negative result of the building of canals was the quick movement of water from the surface of southeast Florida out to the Atlantic Ocean rather than percolating into the groundwater table from which the communities of Dade, Broward, and Palm Beach counties receive their water supply.
- By the 1960s the map shows that there were several lower levies built in Palm Beach, Broward and south into Dade County that kept the water in “conservation areas”.
- These conservation areas held the water and allowed it to filter into the shallow aquifer that is so important for domestic supplies along the heavily populated Atlantic coast.
- The canals were maintained through the 1970s as a way of draining the land south and east of Lake Okeechobee to be used for agriculture. This land has been used exceedingly productively as an area to grow sugar cane, green peppers, corn, beans and many other vegetables.
- A major land use argument began over whether the draining of land and the diversion of water was good for society or bad.
- People interested in water resource management and environmental protection battled in the newspapers, meeting and the courts, with people who made their living in agriculture and real estate, “developers”.
- Canals today vary in size from a few feet wide and deep to several hundred feet wide and 12-15 feet deep. Some canal sides are dirt and grass while others are covered by concrete.
- In order to try and maintain the positive benefits of the canal while also meeting the needs of the physical and biological environment for water, a very complex series of lateral canals
(those going out from the main canal), dams, and pumping stations were built. Other structural modifications were made to satisfy both the rapidly growing population and to protect the physical and biological environment.

- By the 1990s the effort to satisfy both the cultural and physical needs of south Florida was unsatisfactory, if not unsuccessful.
- By the 1990s millions of dollars were set aside in a very large plan developed by the State of Florida and the Federal Government to redirect much of the water flow through the canals from the Atlantic Ocean into the Everglades Florida Bay ecosystem.
- From the 1950s, one of the best examples of the failure of the diversion of the drainage of the wetlands in south Florida were the fires set by lightning where the dry ground actually burned because it was hydromorphic soil, that is, it was developed under water from decaying vegetation and it was susceptible to burning.
- Some other fires burned for many years due to the fact there was not enough water in the soil to put them out.
- Other problems included the near extinction of several bird species and the creation of problems for the alligator and the Florida panther, as well as the disappearance of much marine life.
- In effect, one of Florida’s and the nation’s most prized natural features, the Everglades, and Florida Bay had been detrimentally affected by the canal system that diverted water from the wet ecosystems into either the Gulf of Mexico or the Atlantic Ocean.
- Care must be taken not to categorize the interests such as agriculture, transportation, and municipal and industrial development as evil. Many times as people seek out their own objectives they fail to consider the broader affects that changing one part of the environment has on the rest of the environment. These relationships within the environment or the ecosystem are called synergistic affects.
- Today, many interests, conservation, industrial, agricultural, municipal, and others are working together largely with the cooperation and oversight of the South Florida Water Management District to achieve a water plan which is protective and fair to all interests in South Florida.

**Materials:**
- 2001 Rivers Poster (specifically the large Florida map showing the canals)
- Blackline master of Florida’s Canals
- Blackline master of blank Florida Map

**Procedures:**

**Initiating Activity:** Make an overhead transparency of the Florida Canal Map in the blackline masters. Show the map to the class and ask them to give their opinions about the map and make a list of questions they might ask in order to better understand it.

**Strategies:**

1. Using the river poster map of Florida, have the students discuss the relative location of Lake Okeechobee, Atlantic Ocean, Gulf of Mexico, the Everglades, the low Atlantic coast ridge of land, the St. Lucie River, the Caloosahatchee River, Florida Bay, and the 10,000 Islands.

2. Have students label the blank map of Florida (found in the blackline masters) showing each of
the features mentioned above. Have the class discuss the positive character of the region including the environmental interconnections of each part.

3. Using the same map, have students locate, shade and label the major areas of human populations. Then discuss the use of this physical region. Include: recreation, transportation, esthetic activities, and tourism. Include any others the students might suggest.

4. Have the students make a chart of these human activities, where they are located and if they think they are environmentally friendly or not. Ask students to share their chart and discuss their opinions.

5. Using the internet or the library, find newspaper articles and government reports that discuss the differing positions of competing economic, business, and environmental groups. (See resources for newspaper sites) Once they have found and read the articles, ask them to review their charts to see if they still feel that the activities they listed are still environmentally friendly or not. If they have changed their mind, have them discuss what helped them make that decision.

**Culminating Activity:**
Have students write to the South Florida Water Management District Education office (address and phone number are in the attached resources) and request reports, videos, maps, and films related to canals. Then have students prepare a persuasive paper or speech that would be shared with decision makers discussing canals, fresh water and the citizens of Florida. Every school is located within the limits of one of Florida’s Water Management Districts and each district has an education office that works with schools. They can provide materials, data and even guest speakers for this activity. Use the following discussion questions to help select a topic for their paper.

1. Why are most of Florida’s canals in South Florida rather than North Florida?
2. What is the problem with back-pumping water that has been used on agricultural lands back into Lake Okeechobee or into water conservation areas? Include a discussion of fertilizers, insecticides, and herbicides as pollutants.
3. How is the quality of water important to the Everglades and Florida Bay?

**Evaluation:**
Students maps, discussion, charts and finally their final speech or paper

**National Geography Standards:**
Standard 1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.
Standard 14: How human actions modify the physical environment.
Standard 15: How physical systems affect human systems.

**Sunshine State Standards:**
SS.A.6.3: The student understands the history of Florida and its people.
SS.B.1.3: The student understands the world in spatial terms.
SS.B.2.3: The student understands the interaction of people and the physical environment.