

## Background Material and Study Questions

Background materials for the topics in the lesson plans in this curriculum guide are available on the FGA Geography Awareness Week web site located at <http://getp.freac.fsu.edu/gaw>. This material is from the *Water Resources Atlas of Florida*, edited by Edward A. Fernald and Elizabeth Purdum, 1998, Institute of Science and Public Affairs, Florida State University.

Following are study questions for use with the background materials.

### ***Hydrologic Cycle***

1. Why are the areas of highest evaporation of water not found at the equator?
2. The subtropical regions of the earth have the highest evaporation rates. They are areas identified as latitudes 20.5 N and 10 S. These areas are characteristically blessed with high pressure and trade winds. Explain why high pressure and wind accelerate evaporation.
3. Using a dictionary, define water-table. Is groundwater found above or below the water-table?
4. What is connate water?
5. What is juvenile water?
6. Connate water and juvenile water are added to the hydrologic cycle every year, but accumulations are balanced through the removal of hydrologic water by what process?
7. Using only your words and arrows, draw the hydrologic cycle.

### ***Climate and Weather***

1. States that border on the Gulf Coast from Louisiana to Florida receive some of the highest amounts of annual rainfall in the United States. Can you think of another area in the conterminous United States that is known for its high amounts of annual rainfall?
2. What is the criteria used by the Koppen Climate Type model?
3. What is the criteria used by the Thornthwaite Climate Control model?
4. Look at the map of "Average Annual Rainfall." Which of the models is most like the annual rainfall map? Explain your answer.

### **Groundwater**

1. What is meant by the term "potable water?"
2. If 93% of Floridians depend on groundwater for drinking water, where do the other 7% get their drinking water?
3. What is dolomite? How was it formed?
4. What is a hydrologist?
5. Where does Florida get most of its groundwater?
6. What is meant by "recharging the groundwater?"
7. What is an aquifer?
8. What is the difference between an aquifer and an aquifer-system?

9. Florida has three aquifer-system. Name them in order from shallow to deep.
10. In order to understand the explanation in the reading of how an aquifer works, you need to understand the terms that are used in the text. Define the following words or phrases.
  - A. Sedimentary Rock
  - B. Depositional History
  - C. Sediment Heterogeneity
  - D. Stratigraphic
  - E. Lithostratigraphic
  - F. Petrographic
  - G. Unconsolidated Sediments
  - H. Transmissivity
11. What aquifer-system has the highest transmissivity? Which one has the lowest?

### **Surficial Aquifer System**

1. What is an unconfined aquifer?
2. Where is the Surficial Aquifer-System most prevalent in Florida?
3. What is the main human use of this aquifer?
4. Because the Surficial Aquifer-System is very shallow, it usually takes the shape of the terrain. Look at the map “Water Table Level and Flow.” What do the lines with the numbers attached to them signify?
5. What are these lines called?
6. What is the relationship between these lines and the arrows?

### **Sand and Gravel Aquifer**

1. What is an artesian well?
2. What is a confined aquifer?
3. What is the relationship between an artesian well and a confined aquifer?
4. Why is an unconfined surficial aquifer easily contaminated?

### **Biscayne Aquifer**

1. Why is the Biscayne Aquifer so very important to certain people of Florida?
2. Define permeable?
3. The Biscayne Aquifer is highly permeable and has historically been subject to rising water levels from rainfall. Since 1900 the water level of the aquifer has fallen. Why has this happened and what has happened to aquifer flow?
4. Why have canal control structures been built in southeastern Florida?
5. Why do you think Dade County (Miami) is interested in some of the larger springs way up in the western panhandle of Florida?

### **Intermediate Aquifer System**

1. Define the term “potentiometric?”
2. Where is the Intermediate Aquifer-System located and is it confined or unconfined?
3. Why is the Intermediate Aquifer-System used as a water source in southeastern Florida?

4. Does the Intermediate Aquifer get thicker from north to south or from south to north? How do you know?

### **Floridan Aquifer System**

1. The Floridan Aquifer-System has three divisions, the Upper Floridan Aquifer, the middle confining unit, and the Lower Floridan Aquifer. What does the middle confining unit prevent?
2. Name the three different types of materials that are found in the middle confining unit.
3. What is meant by the term “anhydrite?”
4. Do you think dolomite that contains anhydrite is permeable?
5. Why do you think the way you do?
6. Why don't we sink wells into the Lower Floridan Aquifer, especially south of Lake Okeechobee?
7. What is an injection well?
8. What are the pros and cons of using an injection well?

### **Groundwater and Surface-Water Interaction**

1. What are the two ways that streams interact with aquifers?
2. What is karst topography?
3. Geographically, where is the major karst area located in Florida?

### **Springs**

1. Define a “spring.”
2. What is a first-magnitude spring? How many does Florida have?
3. Where are most of the springs located in Florida?
4. How does the location of the springs compare to the location of the karst areas? Why is this true?

### ***Sinkholes***

1. Define a sinkhole?
2. Name the three types of sinkholes found in Florida and describe how each is formed.

### ***Groundwater Use and Effects on Water Levels***

1. What aquifers are used by 93% of Florida's population?
2. How do State scientists monitor the supply of groundwater?
3. What is a real danger that can occur by pumping large amounts of groundwater from areas near a coast?
4. What are five sources of contaminants that can pollute an aquifer?
5. What are the characteristics that make an aquifer susceptible to groundwater pollution?

## Surface Water

1. The State of Florida is a flat land topographically with large amounts of slow moving surface water. This type of land surface would not normally be conducive to hydroelectric power but there are several places in Florida that have later generators. Do a little research and answer the following questions:
  - a. Are there any hydroelectric generating plants in your area of the state? Where are most of the generators found geographically in Florida?
  - b. How much electricity can they generate and do they function as a supplemental or a primary source of power?
2. Define a drainage basin?
3. What is a karst area? What are the characteristics of a karst area in Florida?
4. In Florida, what is the difference between the soils of the Central Ridge or Western Highlands and the soils of the Flatlands and Coastal Lands?
5. What are the two ways in which the flow in streams is measured? Define each type?
6. What are three largest rivers in terms of discharge in the State of Florida?
7. Define the following terms:
  - a. alluvial river
  - b. anastomosing
  - c. sinuosity
8. What is the difference between an alluvial river and a karst river?
9. In a river what is the difference between a unidirectional and a bi-directional flow? What would cause a bi-directional flow?
10. What is a wetland? What is the difference between a swamp and a marsh?

## Natural Systems

1. What is a hydrological cycle?
2. What is a hydroperiod?
3. What is a controlled burn? Scientifically, what time of year should it be done in Florida?
4. Define eutrophication? What are the problems associated with this phenomenon?
5. Look up *Melaleuca quinquenervia* and Brazilian pepper (*Schinus terebinthifolius*) on the Internet? What are the problems each of these species present to the ecosystems of Florida?
6. Write a short paragraph about *Hydrilla verticillata* and water hyacinth (*Eichhornia crassipes*). Include their origin, introduction, and problems they create in Florida lakes.
7. What effect does freshwater have on an estuarine ecosystem?
8. What is biodiversity? Why is it important? What is happening to biodiversity in Florida?
9. What are Strategic Habitat Conservation Areas (SHCA)? What are they for? What types of lands are involved?