



# SECRET SINK

**SUBJECTS:** Science, Social Studies, English/Language Arts, Health, Physical Education, Consumerism

**GRADES:** 6-8

**DURATION:** One to three 45-60 minute periods

**GROUP SIZE:** 20-30 students working in small groups

**SETTING:** Indoors or outside at tables

**KEY VOCABULARY:** Karst, sinkholes, groundwater, spring, run-off, pollution, community

**ANTICIPATORY SET:** Today we are going to look at a place called Secret Sink and develop a community around it. What kinds of things do we find in a community? How can all aspects of a community work together to create a healthy, productive place to live and work?

**OBJECTIVES:** The students will be able to: 1) develop and express rights and responsibilities for themselves and others; 2) investigate alternative perspectives; 3) work together in a decision making and problem solving situation by applying multiple perspectives.

**MATERIALS:** Scissors; masking tape; glue; surface map that includes a river, spring, and sinkhole (one per group); Secret Sink Community Sheet (one per group).



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## SECRET SINK

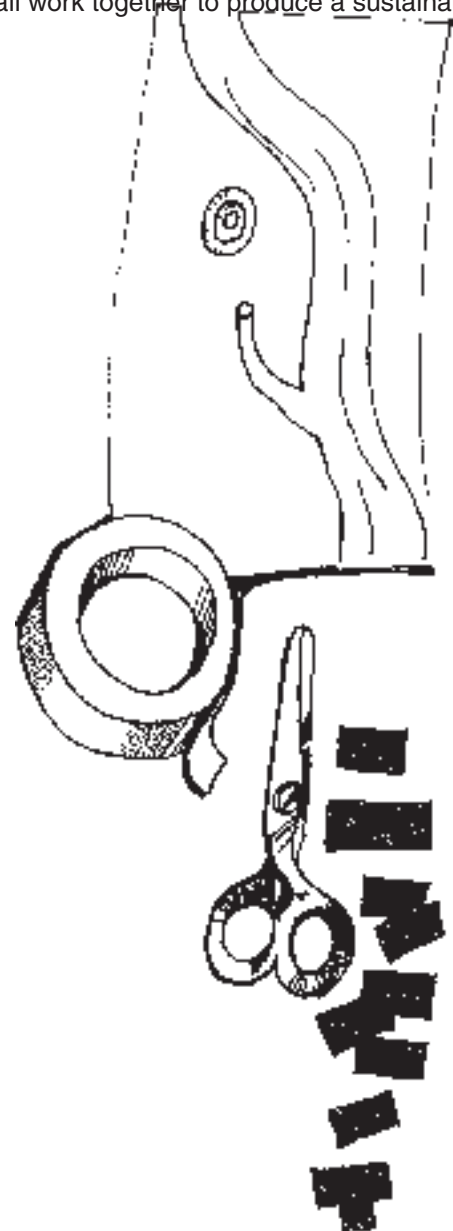
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**BACKGROUND:** All land use can dramatically affect an area. This is particularly true in a karst area. A karst area is distinguishable by the lack of surface streams and an abundance of sinkholes and springs. Following the properties of gravity, water consistently travels to the lowest point, the water table. In most areas of the United States the water travels along the surface as a stream or river. But in a karst area the water is more likely to sink underground to form sub-surface streams or rivers. Underground water may travel many miles before exiting as a spring near or along a surface river.

In a karst landscape, water drains underground by flowing into depressions called sinkholes. Sinkholes are areas where underlying rock layers have given way, causing the upper layers of rock to develop cracks and collapse. Karst terrain is very susceptible to groundwater pollution due to the many sinkholes on the surface that quickly drain water into underground rivers.

When discussing land development in a karst region numerous issues should be addressed. All uses for land can dramatically affect an area, but the problems of groundwater pollution and an increasing human population have the most dramatic impacts on a given area. This is particularly true in a karst area where the abundance of sinkholes can funnel not only surface water but also all types of pollution into the groundwater. This run-off, or drainage of water and water carried pollution, can create major community problems. Because of its numerous surface cracks and holes, a rainstorm within a karst terrain can swiftly wash soils, farming chemicals (including fertilizers, insecticides, pesticides, etc.), or animal waste from adjacent farm land into the underground waterways. Oil and gas residues can wash off area roadways or railway lines. Broken sewage or septic lines can carry human wastes into the underlying water table. If a residential well intercepts these underground streams, the polluted waters can be brought into area homes without the necessary filtration or cleansing. This affects the health and well being of the community.

A community's greatest challenge is to develop a relationship with its surroundings so both can thrive. Planning is the key to a successful partnership with the land. By understanding the workings of a karst terrain and the vital role that water plays in this environment people can make informed decisions to insure that pre-existing plant and animal communities are not greatly disturbed. In the Secret Sink Community industry, agriculture, and general services must all work together to produce a sustainable environment.



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## PROCEDURE:

1. Tell the students that they are responsible for planning a new community in the Secret Sink region. All components of the community must be arranged so that it maximizes the usefulness of this region. The teacher reviews what needs to be developed and the importance of not leaving out any aspects of the community.
2. Divide the class into groups of three to five students. Each group represents a town planning committee. Working together as a team, their job is to plan the "perfect" community -- a community which provides a clean, healthy environment for all its residents as well as the pre-existing plant and animal life.

3. Review the components of the community\*:

*Residents* – live in the area

*Farmers* – use the land to raise tobacco and livestock

*Industry* – uses the land for economic growth and trade

*Small Businesses* – provide local services

*National Park* – preserves and protects the unique environment

*Transportation Department* – insures appropriate transportation throughout the community. This can include highways, railroads and/or water transportation

*Environmental Groups* – protect the sinkholes under any circumstances

\*Other groups can be added.

4. Before the students cut out the materials, "brainstorm" the pros and cons of land use in the Secret Sink community. Record the pros and cons on the board. The table below shows a few examples:
5. Pass out the surface maps, scissors, glue, and the Secret Sink Community Sheets. The surface maps will serve as a base for each group's community. Explain that the group will need to use all the building cutouts provided. These cutouts can be made smaller or they can include more land, but all pieces must be used. The students may also develop other land uses. **Do not paste items down at this time.**
6. Have students work in their groups and begin to develop their ideal community. While doing this,

keep in mind the priorities of each community group. Remember no land use is to be excluded, all community buildings must be used, plant and animal habitats need to be preserved, and everyone in your group should agree. Once all community members agree to the best layout, the pieces should be pasted or taped in place.

7. After each land use plan has been completed, each group now shares their "ideal" community with the rest of the class. During each presentation, community members should explain why they chose the placement of each component of their community. They should also explain how the placement of individual components helps protect, preserve, and maintain the health and well being of other community components.
8. As each presentation is completed, the teacher should tape or hang each completed community along the board or wall of the classroom. Place communities side by side until each group has completed their presentations. Next, have the class focus on the string of communities found along the river. Point out that each represents a town, city, or farming community found along the Green River. Individual components of any one community may protect other components within its town limits, but how do they affect the next community downstream? Did the individual planning committees think about other communities while working on the layout of their own town? Are there different choices that would have made a difference to neighboring communities?

NOTE: There is no "perfect" community. Every community will affect the plant and animal habitats around it, but proper planning can help to alleviate many environmental consequences.

9. To show that our Secret Sink community is not isolated, the teacher uses a U.S. map to show that the Green River flows into the Ohio River which flows into the Mississippi River which flows into the Gulf of Mexico. Now, as we look at our community, how are we affecting other communities down river and around the world?

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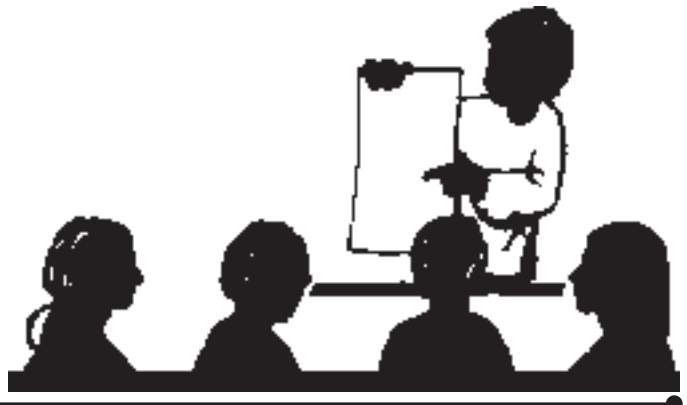
**CLOSURE:** Secret Sink is a special community.

All communities have differences that make them unique. As community planners we need to take these special attributes into consideration. No community is an island. Each has its impact on many environments.

**EVALUATION:** The teacher is able to evaluate the students by observing how the students interact with each other in their groups. Through the students' presentations and discussions the teacher will be able to evaluate their problem solving skills and how well they adapt to different perspectives.

**EXTENSIONS:**

1. Relate Secret Sink to a sinkhole or other potentially hazardous area in or near your community. How is it being used? What kinds of connections can you make?
2. Find articles in local newspapers relating to sinkholes. What problems, concerns, and/or solutions are being discussed?
3. Attend a town meeting to see how your community discusses and plans for your area's development.
4. Brainstorm some changes that could be made within your school community. Prepare your ideas and present them to your school's student council.



SECRET SINK  
COMMUNITY SHEET

GROCERY	GAS STATION	DRY CLEANERS	DINER
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FARM FEED LOT	HOUSE	HOUSE	HOUSE
	HOUSE	HOUSE	HOUSE

TOBACCO FIELD

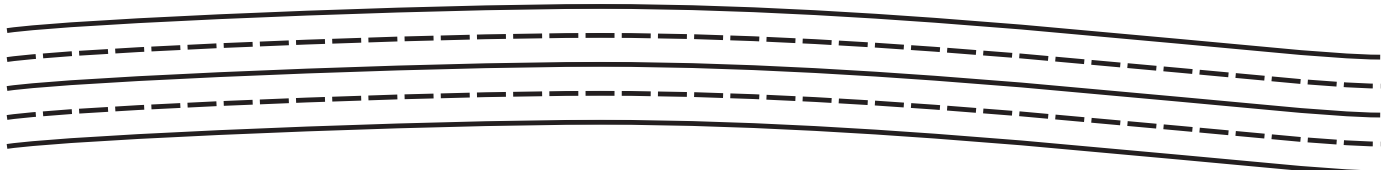
BLEACH FACTORY

FIREHOUSE

NATIONAL PARK

CONDOMINIUM

HIGHWAY

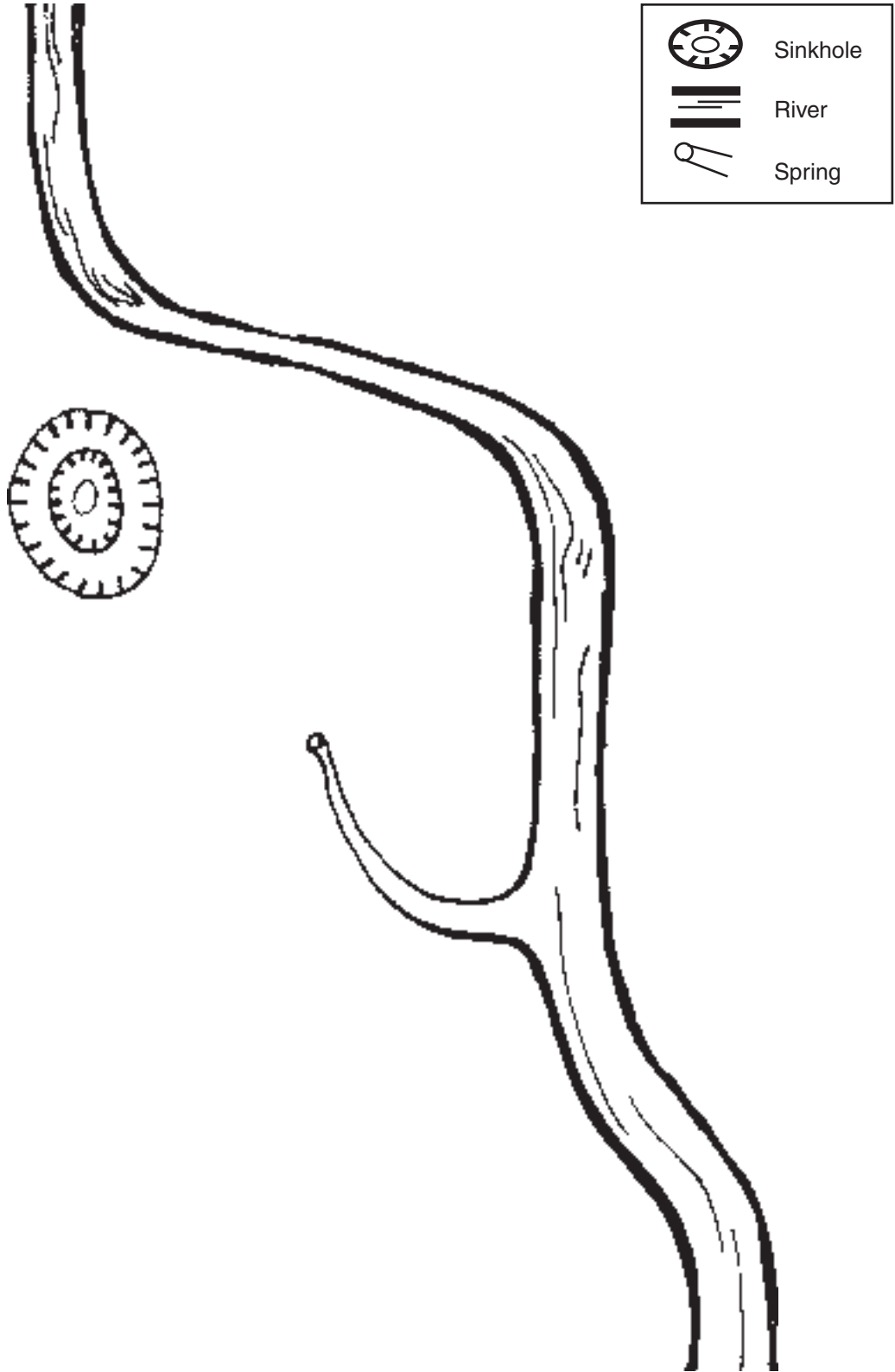


RAILROAD



# SECRET SINK

## MAP



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# SECRET SINK

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## CORE CONTENT

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- PL-M-3.3.2** Improving environmental conditions (e.g., air and water quality) and preserving natural resources impact personal and community health.
- PL-M-3.3.1** A range of resources and services are provided by community agencies such as: public health department, fire department, police department, family resource centers, hospitals, and nonprofit organizations (e.g., American Heart Association, American Red Cross, American Cancer Society).
- PL-M-3.1.5** Environmental issues (e.g., pollution) should be considered when making consumer decisions (e.g., recycling, reducing, reusing).
- PL-M-2.3.2** Rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and nonverbal actions for spectators and/or participants) during games are necessary.
- PL-M-1.8.4** Using appropriate coping strategies (e.g., realistic goal-setting, effective time management, decision-making processes) promotes mental and emotional health.
- PL-M-1.8.3** Strategies (e.g., walking away, communication skills, conflict resolution) for preventing violence vary with the situation.
- PL-M-1.8.1** The use of appropriate strategies (e.g., assertiveness, refusal skills, decision-making techniques) are positive ways to cope with peer pressure.
- PL-M-1.1.1** Individuals have personal rights and responsibilities (e.g., cooperation, communication, patience) when dealing with others (e.g., families, classmates, teams).
- SC-M-3.5.4** The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.
- SC-M-3.5.2** Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans, are consumers, and obtain their food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.
- SC-M-3.5.1** A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
- SC-M-3.4.1** Biological change over time accounts for the diversity of species developed through gradual processes over many generations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.
- SC-M-2.1.5** Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. Water dissolves minerals and gases and may carry them to the oceans.

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## CORE CONTENT

- SS-M-4.4.4** Individual perspectives impact the use of natural resources (e.g., watering lawns, planting gardens, recycling paper).
- SS-M-4.4.3** The natural resources of a place or region impact its political, social, and economic development.
- SS-M-4.4.2** The physical environment both promotes and limits human activities (e.g., exploration, migration, trade).
- SS-M-4.2.2** Places and regions change over time as new technologies, resources, and knowledge become available.
- SS-M-4.2.1** Places can be made distinctive by human activities (e.g., building houses, stores, roads, railroads, irrigation) that alter physical features.
- SS-M-4.1.2** Different factors (e.g., rivers, dams, developments) affect where human activities are located and how land is used in urban, rural, and suburban areas.
- SS-M-2.4.2** Compromise and cooperation are possible choices for positive social interaction and resolution of conflict.
- SS-M-2.3.1** Various human needs are met through interaction in and among social institutions and groups (e.g., family, schools, teams, clubs, religious groups, governments).
- WR-M-1.4** Transactive writing is informative/persuasive writing that presents ideas and information for authentic audiences to accomplish realistic purposes like those students will encounter in their lives. In transactive writing, students will write in a variety of forms such as the following:
- letters
  - speeches
  - editorials
  - articles in magazines, academic journals, newspapers
  - proposals
  - brochures
  - other kinds of practical/workplace writing.
- Characteristics of transactive writing may include :
- text and language features of the selected form
  - information to engage/orient the reader to clarify and justify purposes
  - ideas which communicate the specific purpose for the intended audience
  - explanation and support to help the reader understand the author's purpose
  - well-organized idea development and support (e.g., facts, examples, reasons, comparisons, anecdotes, descriptive detail, charts, diagrams, photos/pictures) to accomplish a specific purpose
  - effective conclusions.