

“Karst King or Karst Klutz?” Lesson Plan

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Lesson Summary: In this lesson the students in small groups will draw a card, then take turns reading and discussing the scenario on the card. The team then has to decide if the scenario on the card would be the action of a **Karst King** (someone who understands the surface/groundwater connection) or a **Karst Klutz** (someone who has not had the opportunity to be educated about the surface and groundwater connection).

This curriculum was written to accompany the educational video “*Karst in the Ozarks.*” Students should watch the video before beginning the lesson. It is available online at <http://www.watersheds.org>.

Missouri Show Me Standards:

Process Standard 3.3: Students will demonstrate within and integrate across all content areas the ability to develop and apply strategies based on ways others have prevented or solved problems.

Science Contents Standards – Strand 5 Earth Systems:

SC5.3A4ab (human caused erosion and proposing solutions)

SC8.1B5a (technology helps scientists)

SC4.1D6ac (effects and solutions to harmful human activities on organisms)

SC5.3a6abc (human impact on resources)

SC5.37ab (renewable resources and water dependence)

SC8.1.C678a (how technological solutions to problems have both benefits and drawbacks)

Related Vocabulary:

Runoff
Household hazardous waste
Point source pollution
Nonpoint source pollution
Erosion

Related Web Links / Background Information:

The cards in this activity were adapted from the booklet: ***Living On Karst: A Reference Guide for Ozark Landowners*** published by The Nature Conservancy, Lower Ozarks Project, 2003.

Required Materials:

A class set of “Karst King or Karst Klutz?” cards for the number of participating groups.

Visuals:

See watersheds.org Karst movie and sinkhole formation

<http://www.watersheds.org/teacher/rd.htm>

Optional Materials: Assorted household hazardous products for cleaning, yard and garden care, home improvement projects, and automotive upkeep.

Safety Considerations:

Before conducting activity: If you are showing any optional household hazardous products, then read the warning and disposal labels ahead of time, so you are familiar with the products' hazards and disposal.

During the lab investigation: Do not let students open any containers of household hazardous products. If you have students pass around the products to read the labels, be sure beforehand that the lids are closed tightly and no residue from the containers are on the outside.

Time Requirements: The desired number of card sets will need to be photocopied and cut. Household and yard hazardous products will need to be gathered if utilizing.

Lesson Warm Up:

Ask students what types of products they use in their home and yards to do the following:

- *Cleaning:* Cleaning products for in and outside of the home
- *Plant Growth:* Fertilizers
- *Pest Protection:* pesticides for gardens and yard
- *Home improvement projects:* paints, thinners, stains
- *Automotive care:* oils, antifreeze

After students make a brainstorm list, add any items not included in the basic list above.

Ask students to recall what they learned about nonpoint source pollution from the "Karst in the Ozark" video. Ask students to explain how these types of products may enter the groundwater. Students may recall the sinkhole trash dumping as one major way. Explain that if people do not use these types of products carefully and correctly according to their labels, they could enter the groundwater by being carried away by runoff from their yards and property, even without dumping them directly into a sinkhole. The water with contaminants will find its way to the sinkholes and losing streams.

Explain that many of these products may be household hazardous wastes and they can be dangerous to humans, plants, and animals. In addition, they can pollute our groundwater in our karst region if they get on the ground. If possible, show them some of these products and read the warning and disposal labels if using optional materials stated above. (For older groups you may pass around the containers to be examined and labels read).

Explain that these materials if placed on the ground can enter into the groundwater by runoff and infiltration that occurs as part of the water cycle.

Explain that if these types of substances get into a waterway and into the groundwater, then they are considered to be nonpoint source pollution, if their original location cannot be determined.

Last, explain that erosion of sediments is also considered a nonpoint source of pollution. Sediments make it difficult for water to maintain dissolved oxygen and therefore will stress aquatic organisms.

“Karst King or Karst Klutz?” Activity:

If working in teams, provide each group with a set of “Karst King or Karst Klutz?” cards. Instruct the students to take turns reading the cards and discussing the content. The group then needs to decide if the action on the card is the action of a Karst King or a Karst Klutz. Explain beforehand that a **Karst King** is someone who understand the surface and groundwater connection, and that a **Karst Klutz** is someone who has not had the opportunity to be educated about the surface and groundwater connection. When the teams finish have them check their piles with a provided key.

Lesson Wrap Up:

Read through several of the cards and have students explain why the scenario is for either a Karst King or Karst Klutz. Explain that individual actions add up to make our karst Ozarks a safe or unsafe place to get clean drinking water.

Modifications:

The lesson difficulty could be decreased by making the following adaptations:

The teacher could have a student pull a card and read it to the class. The class then discusses the card and votes to determine if the scenario represents a Karst King or Karst Klutz.

The lesson difficulty could be increased by making the following additions:

The students could create their own scenarios and see if other groups can determine if these scenarios protect or threaten groundwater.

Assessments:

To assess the students learning, have them create a list of actions that residents can take in their homes, yards and community, then have students say whether each action protects or threatens groundwater quality.