The Karst Connection Unit

Lesson 1. Introduction to Hydrology

Goals for the Lesson

1. Introduce students to hydrology and Karst topography
2. Draw connections between surface water and ground water.
3. Introduce controversial ethanol plant proposal.

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

How is surface water connected to groundwater?

Lesson Assessment

- Formative Assessment via agreement continuum activity & water cycle initial model
- Learning Log

Learning Resources:

- https://learningcenter.nsta.org/resource/?id=10.2505/4/tst14_081_01_39
- https://learningcenter.nsta.org/resource/?id=10.2505/4/tst16_083_02_23
- http://ngss.nsta.org/Practices.aspx?id=2
- http://nstahosted.org/pdfs/ngss/resources/201203_framework-krajcikandmerritt.pdf

Instructional Sequence	**Materials/Supplies**
Introduction to modeling and argumentation as a scientific practice	http://ri2.missouri.edu/going-further/related-reading
Students design a pre-unit water cycle model	Water Cycle Model Packet
Students explore sources on *Ethanol – Know Your Sources handout*. • Students are divided into 7 small groups. • Each group reviews the unit website for two of the source organizations using taking brief notes on the following questions: o Who is (or what organization or company) presenting the information? o What is the purpose of the publication? o What expertise and/or relevant experience does the author (or organization or company) have? o What biases does the author (or organization or company) have and how might those biases affect the presentation of information? o Does the information presented seem to be accurately reported?	*Know Your Sources* handout Notebook computers or tablets as needed for each group.

Are the claims made in the presentation supported? Do any facts or analyses seem to be distorted? o Does the presentation leave important information out? Does the presentation offer information that is unnecessary (particularly if the extra information distorts the message)? Each group shares with the rest of the class what they learned about their assigned source.	
Teacher introduces the controversy of ethanol production by asking, "Why is ethanol for fuel production controversial?" Teacher allows students to briefly comment on the question as a whole class. Teacher then suggests that we get a feel for our own "beliefs" before moving forward. Teacher reminds students that there is no right or wrong answer; that we are just getting a feel for our personal thoughts. Students then arrange themselves along an agreement continuum (strongly disagree on one side of the room/strongly agree on the other side) in response to several questions regarding ethanol production for fuel. (Optional) Students may share the reason for their location on the continuum. Teacher then leads students through a variety of social and scientific perspectives on ethanol production covering subsidies, emissions, climate change, economy, etc.	Posted signs: "Strongly Agree" "Strongly Disagree"
Driving tour of local water resources: Initial visit to proposed ethanol plant location test well Tour nearby spring & cattle confinement facility Connections between local water resources and climate change discussion from earlier.	Small group discussion on stakeholder viewpoints Full class discussion of water resources
Learning Log Activity • Describe three different perspectives on ethanol production. • Why do you think people have such varied responses to this topic? • Address at least one of the prompts from three of the learning log sections	Learning Log

The Karst Connection Unit

Lesson 2. Introduction to Water Quality Monitoring

Goals for the Lesson

1. Introduce students to the abiotic and biotic factors that influence stream equilibrium.
2. Introduce students to stream monitoring techniques & meaning for each standards

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

What is stream health?

Lesson Assessment

Written Responses from data collection
Learning Log

Learning Resources:

http://mostreamteam.org/
http://mostreamteam.org/wqresources.asp

Instructional Sequence	**Materials/Supplies**
Field trip to local stream for initial training on water quality assessment • Water chemistry tests provide **snapshot** of stream health: Nitrates, Phosphates, pH, turbidity, temperature, Dissolved Oxygen • Biotic indicators provide **longterm** view of stream health: Group 1, Group 2, Group 3 aquatic invertebrate tax • Teacher splits class in half: 1 group working biotics, 1 group working chemistry. These halves divide further into small groups. It helps to have multiple instructors available for this training day. Once students become adept with the sampling technique they work independently. • As students collect data, they enter into iPad water quality spreadsheet as well as their student notebooks. Note to instructors: Missouri stream team and the Department of Natural Resources provides training for stream team work. http://mostreamteam.org/vwqm.asp	http://mostreamteam.org/wqresources.asp Water Quality Monitoring packet Vernier probes Lamotte Colorimeter & Reagents Kickscreens & Dipnets Stream Health Spreadsheet
Small group presentations of findings Large group sense-making about what findings mean Students complete learning log	Student Learning Log
EQUIPMENT LIST BELOW:	

The following water quality monitoring probes work well with this lesson. This is a full supply list. The items in green are the minimum necessary. **Venier Probes** LabQuest Stream LabQuest2 XL-Thermocouple Temp Dissolved Oxygen *(This is an optical probe, another option is the lamotte chemical tes below)* Flow Rate pH Photosynthesis Soil Moisture RelHumidity Rotary Motion Anemometer **Lamotte** Lamotte Smart Colorimeter Nitrate Phosphate DO pH Case Cuvettes Qualitative Coliform kit. A variety are available from Lamotte, Hach, and other companies. Check Amazon.com for good prices.	

The Karst Connection Unit

Lesson 3: Ozark Underground Laboratory Field Trip
** Alternate venues: Local university geology department, Commercial cave tour, Department of Natural Resources specialist, Missouri Department of Conservation specialist, DIY cave tour, or other local that fits local context.*

Full Day

Goals for the Lesson

1. Students will interact with leading hydrology experts
2. Students will develop an understanding of Karst Topography as a geologic feature of the Ozarks
3. Students will continue to explore and interact with the connections between surface and underground geologic and biotic components

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

How is surface water connected to groundwater?
Why should this matter to me?

Lesson Assessment

Written Responses from data collection & Karst Handout
Learning Log

Learning Resources:

http://mostreamteam.org/
http://www.ozarkundergroundlab.com/

Instructional Sequence	**Materials/Supplies**
Make arrangements for tour of facility well in advance (recommend at least 3 months for OUL) Surface tour 9am to Noon Break for lunch Underground tour 1pm to 4pm Optional Bat flight at dusk	Intro to Karst Handout
Surface Tour • Students observe and interact with Karst topography features while engaged in discussion with leading hydrologist, Tom Aley & OUL staff • Students should become familiar with the following terminology & concepts from surface tour: Sinkhole, North/South facing slope aspect, Cave recharge area, Karst Window, Spring outlet, Septic field, Infiltration, Limestone, Dolomite, Karst Topography, Native vs Invasive species, Potable water, Ground water, Water well construction, Wastewater treatment types and construction, Impermeable vs permeable. • Following surface tour, students work on learning log and Karst handout	Intro to Karst Handout Learning Log

Underground Tour • Students observe and interact with underground Karst topography features while engaged in discussion with leading hydrologist, Tom Aley & OUL staff • Students should now be able to connect the surface and underground features from earlier in the morning as well as observing and interacting with the following underground features: Sinkhole recharge zone, Cave formations (stalagmite, stalagtite, curtains, flowstone), Troglodyte species, Limestone, Dolomite, Karst Topography, Native vs Invasive species, Potable water, Ground water, Water well construction, Bat biology, White-nose syndrome. • Following underground tour, students work on learning log and Karst handout • *OUL typically works with post-secondary students in their education outreach programs. It is imperative that students are respectful and do not stray from the path in the cave during the tour. Failure to do so may negatively impact the opportunity for future outreach events.*	Intro to Karst Handout Learning Log
Field trip to local stream for initial training on water quality assessment • Water chemistry tests provide **snapshot** of stream health: Nitrates, Phosphates, pH, turbidity, temperature, Dissolved Oxygen • Biotic indicators provide **longterm** view of stream health: Group 1, Group 2, Group 3 aquatic invertebrate tax • Teacher splits class in half: 1 group working biotics, 1 group working chemistry. These halves divide further into small groups. It helps to have multiple instructors available for this training day. Once students become adept with the sampling technique they work independently. • As students collect data, they enter into iPad water quality spreadsheet as well as their student notebooks. Refer to Lesson plan 2 for additional details on this activity. Note to instructors: Missouri stream team and the Department of Natural Resources provides training for stream team work. Small group presentations of findings Large group sense-making about what findings mean Students complete learning log	Water Quality Monitoring packet Vernier probes Lamotte Colorimeter & Reagents Kickscreens & Dipnets Stream Health Spreadsheet Student Learning Log
Optional Bat Flight & Dusk Students sit near the cave entrance to observe bat flight at dusk. Approximately 10-50,000 bats will exit the cave at this entrance.	Learning Log

The Karst Connection Unit

Lesson 4. What is a Watershed?

Goals for the Lesson

1. Students research specific local watersheds in their community
2. Students model landscape changes and precipitation with MMW website.

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

What is a watershed?

Lesson Assessment

- Watershed Modeling Handout
- Mid-unit Water cycle modeling
- Learning Log

Learning Resources:

http://www.wikiwatershed.org
http://dnr.mo.gov/education/bigriver/lesson-plans/where-does-it-flow-generic.pdf

Instructional Sequence	**Materials/Supplies**
Class De-brief on previous activities: 1. Modeling & argumentation as scientific process 2. Water quality monitoring 3. OUL trip 4. Karst Topography surface and underground interactions	
Students build physical model of a watershed Students construct a physical model of a watershed and model runoff and pollution scenarios building off of prior experiences with the unit. Full details at following Missouri Department of Natural Resources Website: http://dnr.mo.gov/education/bigriver/lesson-plans/where-does-it-flow-generic.pdf	Spray bottle Large aluminum baking pans or plastic tubs (16 X 11; 2-3 inches deep) 18" wide aluminum foil 6 partially crumpled soda cans Masking tape Thin sponge brightly colored Scissors Food Coloring Cup of fine soil or cocoa powder

Students explore digital Model My Watershed website. • Students independently explore basic watershed model on MMW website • Group de-brief on surface, runoff, soil connections • Teacher presents full MMW modeling suite on whiteboard • Explore area (used background imagery from Google earth and overlays GIS layers to model vegetation & precipitation impacts on surface runoff • Students group in pairs or threes to explore full MMW website • Create MMW Login • Students tasked with modeling a watershed of their choice. Steer students toward something they are familiar with (neighborhood, school area, playground) • Each group models watershed variables and takes brief notes on the following questions: o What watershed did you model and why? o How are you familiar with this area? o What variables had the least impact on watershed surface runoff? Why? o What variable had the greatest impact on watershed surface runoff? Why? o What is your recommendation for human activity in the watershed you modeled? Each group shares with the rest of the class what they learned about their assigned source.	Watershed Modeling handout http://www.wikiwatershed.org
Follow-up discussion about watershed modeling • How does today's activity connect with our visit to OUL • In what ways do the surface activities you modeled have connections with underground Karst features? •	Student Notebooks
Mid-unit Water Cycle modeling. Students return to original water cycle modeling packet and revise their original incorporating their understandings to this point.	Water Cycle Modeling Packet
Students complete learning log entry specifically addressing connections with OUL visit and MMW modeling activity.	Learning Log

The Karst Connection Unit

Lesson 5. Birds as Environmental Indicators

Goals for the Lesson

1. Students interact with local bird experts
2. Students understand how birds serve as larger ecosystem health indicators.
3. Students connect stream health to bird health to ecosystem health.

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

How does our water quality monitoring connect with birds?
How are birds environmental indicators.

Lesson Assessment

- Food Web and Ecological Pyramid Handout
- Learning Log

Learning Resources:

http://mrbo.org/
http://riverlands.audubon.org/visit/riverlands-migratory-bird-sanctuary-trails
https://www.allaboutbirds.org/
http://mobirds.org/
http://mo.audubon.org/state-office-and-local-chapters
http://www.pwrc.usgs.gov/bbl/default.htm
http://climate.audubon.org/
http://eBird.org

Instructional Sequence	**Materials/Supplies**
The designer of this [RI]2 unit is a federally licensed bird bander, and has the ability to facilitate this lesson in house. This may be a difficult field trip to arrange, but is worth the effort to make a larger connection between water quality, birds, and the overall health of an ecosystem. Other bird related field experiences are possible besides a banding experience that may yield similar results. Make arrangements for field trip well in advance. *Possible venues: Missouri River Bird Observatory, Riverlands Migratory Bird Local university ornithologist, Local Audubon birding chapter, Missouri Department of Conservation specialist*	
Food Web & Ecological Pyramid Analysis Students work in small groups to make a food web of the aquatic ecoystems so far from the unit. One group might take a stream ecosystem, another a lake or pond ecosystem, and another the cave ecosystem from the OUL field trip. Allow students to branch out and explore other possibilities if they show interest. Important concepts to review: • Habitat	Notebook computers or tablets for food web research Food Web and Ecological Pyramid Handout

• Niche • Food webs / food chains • Trophic levels—producers, primary consumers, secondary consumers, etc. • Herbivores, omnivores, carnivores • Predators, scavengers • Decomposers • 10% Rule • How this all fits back together with watersheds, and the biotic & abiotic	
Students explore bird conservation and the role birds play as environmental indicators of overall ecosystem health while engaged in birding and/or bird banding research. • Bird banding occurs to track longevity and migration patterns • Students have the opportunity to interact with birds through banding process learning aging, sex, plumage, and measurement techniques • Students have the opportunity to interact with bird researchers, and inquire about their work. • Holding a wild bird in the hand and releasing it is a power affective component of this activity. Many students have powerful emotional connections with this opportunity. Students explore ebird.org website. They may want to create an account and enter their observations as a citizen science project.	Learning Log http://ebird.org
Allow students time to reflect and complete a learning log entry for this activity. Follow up discussion about experience. Allow discussion to flow and for adequate time for students to digest the day. Guide students in discussing the following: Habitat and Niche for the birds that were observed and banded What role do the birds play in the ecosystem (upper level predators feeding on insects primarily, and seeds secondary) How are the birds connected with the water quality monitoring and Karst studies students have experienced so far? How can the birds serve as environmental indicators for scientists to monitor the health of the ecosystem? (Due to their niche, birds are exposed to the same environmental factors as the aquatic invertebrates used for stream biotic assessment. They feed on insects and thus serve as another level of biotic indicator species. If the bird populations decrease, it is a signal that something in the ecosystem is out of equilibrium)	Whole class discussion Learning Log

The Karst Connection Unit

Lesson 6. Watershed Center of the Ozarks Field Trip (optional)

** Alternate venues: (pick a different option than lesson 3) Local university geologist, Commercial cave tour, Department of Natural Resources specialist, Missouri Department of Conservation specialist, DIY cave tour*

Goals for the Lesson

1. Students build on their understandings of Karst topography as a geologic feature of the Ozarks
2. Students interact with local water quality experts
3. Students explore green building strategies to minimize potable water misuse and wastewater disposal issues

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

What is green building?
What can I do to mitigate my misuse of water resources?

Lesson Assessment

Learning Log
Group Discussions

Learning Resources:

http://watershedcommittee.org/
http://watershedcommittee.org/the-watershed-center/
http://www.jamesriverbasin.com/
https://archive.epa.gov/greenbuilding/web/html/
http://www.usgbc.org/articles/grid

Instructional Sequence	Materials/Supplies
Make arrangements for tour of facility well in advance This is an optional lesson for this unit. It compliments the OUL field trip in Lesson 3 well and builds upon that information with the addition of green building and sustainability topics.	
Karst Tour • Students observe and interact with Karst topography features while engaged in discussion with WCO staff. • Students should build upon their prior hydrology field trip experience and be able to interact with staff using Karst terminology & concepts: Sinkhole, North/South facing slope aspect, Cave recharge area, Karst Window, Spring outlet, Septic field, Infiltration, Limestone, Dolomite, Karst Topography, Native vs Invasive species, Potable water, Ground water, Water well construction, Wastewater treatment types and construction, Impermeable vs permeable.	Learning Log

Watershed Center Building Tour • Students learn about green building techniques to maximize water conservation including: • Green Roofs, • Grey water systems • Waste water treatment options • Rain Gardens, Rain Barrels and other ways to utilize rainwater for lawn care.	Learning Log
Field trip to local stream for initial training on water quality assessment • Water chemistry tests provide **snapshot** of stream health: Nitrates, Phosphates, pH, turbidity, temperature, Dissolved Oxygen • Biotic indicators provide **longterm** view of stream health: Group 1, Group 2, Group 3 aquatic invertebrate tax • Teacher splits class in half: 1 group working biotics, 1 group working chemistry. These halves divide further into small groups. It helps to have multiple instructors available for this training day. Once students become adept with the sampling technique they work independently. • As students collect data, they enter into iPad water quality spreadsheet as well as their student notebooks. Refer to Lesson plan 2 for additional details on this activity. Note to instructors: Missouri stream team and the Department of Natural Resources provides training for stream team work. Small group presentations of findings Large group sense-making about what findings mean	Water Quality Monitoring packet Vernier probes Lamotte Colorimeter & Reagents Kickscreens & Dipnets Stream Health Spreadsheet
Small group discussion Large group wrap-up Individual reflection in learning log with specific prompt to address: What is green building? What can I do to mitigate my misuse of water resources?	Learning Log

The Karst Connection Unit

Lesson 7. Ethanol & Karst

Goals for the Lesson

1. Introduce students to ethanol as an alternative biofuel.
2. Research issues surrounding the construction of groundwater sourced ethanol plant.
3. Explore different stakeholder perspectives for building an ethanol plant in our community.

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

How is ethanol as a biofuel produced?
How do the different stakeholders in our community feel about the proposed ethanol plant?

Lesson Assessment

Presentations on ethanol and groundwater research
Stakeholder presentations
Written Response to Following Prompt in Learning Log:

- Describe three different perspectives on the proposed ethanol plant.
- Why do you think people have such varied responses?

Learning Resources:

http://www.yaleclimateconnections.org/2015/01/pros-and-cons-of-ethanol-in-motor-vehicle-gas-explored/
http://www.icminc.com/innovation/ethanol/ethanol-production-process.html
https://www.extension.purdue.edu/extmedia/id/id-328.pdf
https://www.youtube.com/watch?v=lXnUCPPTDOc
http://dnr.mo.gov/geology/wrc/groundwater/index.html
http://extension.missouri.edu/p/EQM103F
http://groundwater.ucdavis.edu/files/156563.pdf

Instructional Sequence	**Materials/Supplies**
Review Discussion Teacher leads class in discussion of unit topics so far. We return now to the SSI around the construction of a groundwater based ethanol plant in our local community.	
Students review evaluating sources handout from Lesson 1. **Small Group research on issues surrounding ethanol plant construction proposal** Students divided into small groups each given the task to research one of the following: Ethanol Production Methods Groundwater well construction Drinking water sources & how each works Ethanol as fuel additive Pros Ethanol as fuel additive Cons	Evaluating Sources Handout Notebook computers or tablets Data Projector

Students research the tasks and report back to the group with PPT or Keynote presentations	
Discussion on stakeholder positions Small groups brainstorm list of stakeholders and their likely opinions on the construction of a groundwater based ethanol plant in our community & share with larger group Class discussion to narrow list of stakeholders. Students shuffled into new groups each give the task to research one of the stakeholder groups and produce a position statement in regard to the construction of the ethanol plant. Suggested stakeholders: City Councilperson Farmer leasing land to Ethanol corp Family with water well next door to Ethanol plant (Add other stakeholders and extra groups as needed from class discussion) **Alternate activity – guest speakers from each stakeholder*	Evaluating Sources Handout Notebook computers or tablets Data Projector
Written Response to Following Prompt in Learning Log: • Describe three different perspectives on the proposed ethanol plant. • Why do you think people have such varied responses? • Address at least three additional learning log prompts	Student Learning Log

The Karst Connection Unit

Lesson 8. Wastewater and Karst

Goals for the Lesson

1. Introduce students to wastewater treatment
2. Explore connections between wastewater and Karst topography.

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Lesson Guiding Questions

How is wastewater treated?
How is wastewater treatment different in rural and urban areas?
What is a septic system, and how is it maintained?

Lesson Assessment

- Written response to student wastewater treatment handout
- Learning Log

Learning Resources:

http://mosmallflows.weebly.com/
http://www.moruralwater.org/
http://mwea.org/
http://dnr.mo.gov/env/wpp/Wastewater-SepticSystems.htm
https://www.como.gov/PublicWorks/Sewer/wwtppg_4.php
http://goo.gl/xN5a1b
http://agrability.missouri.edu/ruralsafety/factsheets/Septic_Maintenance.ppt

Instructional Sequence	Materials/Supplies
Overview of Wastewater treatment for municipalities	Wastewater PPT from Southeast Missouri State University – Dr. Stephen Overmann
Overview of Rural Septic system wastewater treatment Two basic methods – Septic treatment system, Lagoon treatment system.	Septic Maintenance PPT from Missouri Extension service
Students explore their own wastewater treatment system. Students determine if they are utilizing a septic/lagoon treatment system or are part of a municipal treatment system. They should also investigate the school's treatment system. A good way for students to determine their treatment system is to research if they pay for sewer service on their utility bill. If so, it is a municipal system, if not they will typically be on a septic or lagoon system.	Independent student research Student wastewater treatment handout

Optional Field trip to local municipal wastewater and drinking water treatment systems or guest speaker from wastewater department visits school Most municipalities offer education tours of wasterwater and drinking water treatment systems. This is a powerful connection and drives away the "magic pipes" phenomenon in which students are unaware of where there sewage goes and how it is treated and/or where they get their drinking water. Make arrangements for these opportunities well in advance. Students complete a learning log following the field trip/guest speaker.	Student Notebooks Student Learning Logs
Field trip to local stream for initial training on water quality assessment • Water chemistry tests provide **snapshot** of stream health: Nitrates, Phosphates, pH, turbidity, temperature, Dissolved Oxygen • Biotic indicators provide **longterm** view of stream health: Group 1, Group 2, Group 3 aquatic invertebrate tax • Teacher splits class in half: 1 group working biotics, 1 group working chemistry. These halves divide further into small groups. It helps to have multiple instructors available for this training day. Once students become adept with the sampling technique they work independently. • As students collect data, they enter into iPad water quality spreadsheet as well as their student notebooks. Refer to Lesson plan 2 for additional details on this activity. Note to instructors: Missouri stream team and the Department of Natural Resources provides training for stream team work. Small group presentations of findings Large group sense-making about what findings mean Students complete learning log	Water Quality Monitoring packet Vernier probes Lamotte Colorimeter & Reagents Kickscreens & Dipnets Stream Health Spreadsheet Student Learning Log

The Karst Connection Unit

Lesson 9. Culminating Climate Change Model

Goals for the Lesson

1. Assimilate information gained over the course of the unit into a culminating project illustrating the impacts of a commercial scale groundwater based ethanol plant.
2. Use the scientific process of modeling as a predictive feature for the previous stated goal. Write a position paper to local city government officials using your model.

Unit Guiding Question

Should a groundwater based ethanol plant be built in our community?

Culminating Project Guiding Question

Should a groundwater based ethanol plant be built in our community?

Assessment

1. Culminating Project
2. Water Quality and Karst Content Test (Optional)

Learning Resources:

http://www.scholastic.com/teachers/asset/lesson-two-position-paper-rubric
http://www.readwritethink.org/classroom-resources/lesson-plans/convince-developing-persuasive-writing-56.html
http://www.readwritethink.org/lesson_images/lesson56/persuasive_strategies.pps

Instructional Sequence	**Materials/Supplies**
Instructor presents guiding question and culminating project: *Should a groundwater based ethanol plant be built in our community?* Students will research and create a position statement drafted to local community leaders regarding the proposal to build a groundwater based ethanol plant.	Whiteboard Computer Projector
Before students begin working on their culminating project, they should take time to review and evaluate sample models from the unit. Students have created and revised an explanatory model of water cycling showing human connections. They should use chosen samples of these models for this activity. This activity is designed to help them create a list of criteria needed for an effective culminating predictive model. Students work in small groups to evaluate and critique sample models. Explain to students that these models are all explanatory	Sample models for review and evaluation. Model evaluation worksheet Water Cycle Modeling Packet

models. Their culminating model should incorporate knowledge from the entirety of the unit.	
Culminating Project Students will create a persuasive position statement for/against the ethanol plant proposal. Optional – Students develop summary position presentations for parents, school administration, and city officials.	Model Evaluation Worksheet Notebook computers or tablets. Position Paper Rubric from scholastic.com Persuasive Writing Strategies PPT from readwritethink.org Persuasion Map from readwritethink.org
Ecology Content Test Although the culminating project will assess most of the learning goals of this unit, the instructor may want to give a more explicit content test.	Water Quality and Karst Content Test