National Park Service
U.S. Department of the Interior
Pictured Rocks National Lakeshore

www.nps.gov/piro/forteachers.htm

Education Outreach
N8391 Sand Point Rd.
P.O. Box 40
Munising, MI 49862
(906)-387-2607

"The Great Speck-Tackle"
Winter Fifth Grade Outdoor Activity

Michigan Science Objectives: At the end of this lesson, students will be able to:

1. Name materials that cycle through the environment (Ecosystem 10).
2. Describe the physical properties of water, snow and ice (Matter and Energy 8).
3. Describe one way in which humans alter the water cycle (Ecosystem 11).

Thinking Skills: Observe, predict, classify, compare and contrast, and reason logically

Overview of Activity: Students follow self-guiding trail on snowshoes using trail guide booklet that teaches the basics of the water cycle. Trail guide and lesson plan details may be purchased from the Institute for Earth Education. The Great Specktackle is found in the text "Conceptual Encounters 1."

National Park Connection: National Parks are places of great cultural and natural resource treasures. These treasures can be harmed by polluted water cycles bringing in damaging chemicals from great distances away.

Materials needed: Specks bag, apple, speck dissector, water bucket, paper clips, hand mirror, trail guide books, trail guide posts, snowshoes, snowflake catchers, snowflake charts, paper cup, ice spud for pre-drilled hole, thermometer on string, animal track cards and magnifying lenses.

Procedure:

Introduction: "Today we are going to think like scientists and continue to explore how water behaves and the circle or cycle it travels in. We will do a demonstration and investigation inside, then head outside, put on snowshoes, and follow the paths of water specks! Next, we will go exploring out by a beaver pond to discover more about this magical, mysterious life giving substance called water! Finally, we hope to let you sample some of these famous specks!"

"Scientists believe that everything in the universe is made up of one of two things. Who knows what those are?" (Either energy or matter.) "All matter on earth can be broken down into molecules -- or we can call them specks -- because they are so small that they are sometimes invisible to our eyes. Three basic kinds of specks we have are air, soil and water. Many times the specks mix. Let me show you."

"Using my special speck dissector, I will put this apple in and out comes specks of air, water and soil." (Illustrated with three baggies of different colored clay balls.) "You see, apples are made up of air, water and soil or nutrient molecules. Would somebody like to assist me now? I need a keeper of the air, soil and water molecules. I would like to demonstrate further.

First, I would like to make something that has perhaps equal parts water, soil and air. What is it? (Allow time for student responses.) That's right -- it's a tree!"

"Next, I would like to make something that is mostly soil specks but also has some air and water molecules in it. Pass me three soils and one of each of the others. Guess what it is." (Allow time for student responses.) "That's right - it's a rock!"

"And now for the big one! It is mostly water, with big hollow tubes running through it. It is constantly taking in and getting rid of specks. It also has some nutrients and air molecules in it. Pass me three water and one of each of the other molecules or specks. Can you guess what it is?" (Allow time for student responses.) "That's right - it's a person!"

"We breathe in air molecules of oxygen, and we exhale molecules of carbon dioxide. We drink water specks and get rid of molecules we do not need. With soil specks, it is the same. I do not know about you, but I do not like to eat dirt. How do we get our soil or nutrient molecules? That is right. Through the plants, we eat. They get their nutrients and minerals from the soil -- by absorbing them up through their roots. So when I eat a plant or animal I get my specks of soil, then the waste soil specks come out!"

"We are really just a collection of molecules or specks with more molecules passing through us to be used over and over again." (Hold up globe.) "In our world there are only so many molecules of air, soil and water to go around so they must be used over and over again or recycled."

"Today I would like you to act like a scientist when you are outdoors and very carefully observe, using your senses, the way these specks behave in the natural world. Your fate and the fate of many other living things may rest on your understanding of these ideas. I may be back later to see if can interpret your observations and make an appropriate conclusion about them."

Review snowshoe use, invention by Native Americans, safety, getting lost, safety person for road, restrooms.

Specks Trail Guide (Investigations Written In Activity Guide):

"Before we begin this next activity, please remember there are only so many or a limited number of specks of water out there, so they must be recycled and used over and over again. Some of these specks have been on some amazing journeys in some pretty far out places. In fact, right now you are going to get to follow the paths of some of the specks from Speck Trail Junction. This way please."

Demonstrate how trail guidebooks work. Divide into groups for six trails. Each group visits three, one for each different color. Take turns reading and doing activities. Students use self-guiding trail guidebooks to follow the trails of water molecules or specks.

Read the postcard and show specks album to those finishing early.

“Everyone understands the trail guides and what happened. Can someone explain his or hers? Any questions? Anybody observe black dots? What were they? (Allow time for student responses.) Poison speck! Let me tell you a story of a water speck and a poison speck.”

Read story and show pictures of how some pollution got into the air, attached to a water molecule, fell into a lake, got into plants, then a fish, then was eaten by a human!

“What did the story mean? It is getting harder for water specks to avoid to becoming poison specks because they move around a lot and can pick up or give off poison as they become parts of many different things like clouds, streams, snow and even people! “

Next Activities:

“Let’s head out now to explore water specks some more!” Hike up trail a bit.

Stop 1: (Snowflake catchers and lenses)

“Does anybody know how snowflakes are formed? Water specks in gas form freeze in very cold temperatures in the sky into a crystal on a speck of dust, pollen, or even other chemicals floating up in the sky."

"Are all snowflakes the same? Let's do some observations to find out.” Pass out snowflake catchers and hand lenses to see if they are. Pass out laminated cards of flakes (Appendix 3) and snow names (Appendix 6) for students to see.

“Why aren't all snowflakes the same?” (They are created under different conditions of temperature and moisture in the sky.)

Distribute snowflake catchers and hand lenses. Try to identify different kinds of snowflakes along the way.

“Look on top. Under. Snow falling from the sky.”

Stop 2:

Look at snowdrift. Is same kind of snow on top as in middle or bottom? What can we do to find out? Do it. What changes? (temperature, weight or pressure)

Look at Native American snow chart. (See Appendix 6) Why do they have so many names for the same thing? NOT SAME - affects what that means for their outdoor lives!

What specks are in snow? (water and air)

Will this affect temperatures? What to do to find out? Do it!

Use thermometers!

Stop 3: Trees

Discuss conifer and deciduous tree relationships to water cycle.

Stop 4: Cliffs

Pictured Rocks cliffs behind pond. What will happen to snow specks this spring? Where will they go?

Stop 5: Ice

Pass around sample of frozen water specks. Why did they go from liquid to solid? (Temperature.) As molecules slow down they get hard. Can you think of an example of something else that solidifies as it cools? (Jell-O, cookies.)

Ice on pond. What kind of specks? What type of matter form: liquid, gas or solid? At what temperature does water freeze? (Water freezes at 32 degrees.) How deep does water freeze? What happens to water below ice? How does snow affect ice build up? What do the students think temperature is just below ice? Chip through augured hole and take temperature. "Based on what you know about ice, water and air specks, what is the value of having water specks turn to ice on the top of the pond?"

Stop 5: Beaver Lodge

Hike to beaver lodge. "What is this? How do beaver survive the ice and snow cycle?"

Pick up handful of snow. "See that this snow is fluffy, not compact, and has lots of holes or air spaces for oxygen to pass through. What other good thing do these air spaces do in the snow?" (insulate) "Guess what happens when you walk on snow or drive on it with a car or snowmobile?" (It compacts air spaces.) "Based on this information, why do you think I am asking you not to walk across or ride your snowmobile across a beaver lodge?" (Less air and more cold for the beavers.) "This is similar to why people's water pipes freeze under their driveway. Who could explain?"

Observe different colored boards that were placed on snow. What has happened and why? Dark colors absorbed heat and heat melted some snow molecules.

Stop 6: Cedar Swamp (if time permits)

Explore cedar swamp. Why deer live here in winter? Are there any animals that like deep snow?

Head back. Quietly listen and look for birds and other animals. Along the way, use key of animal tracks card to find signs of animals in the snow specks.

Conclusion:

Back inside warm building.

“Now I would like you to apply what you know about the movement of water. Here is a difficult question for you. What if I dumped some oil on the road by that pond surface today? How could that oil pollution end up on some kid’s tomato in his garden in Maine next summer?

Water Bottle - So are you ready to sample some water George Washington or Rachel Carson may have sampled?

The label falls off, revealing another label calling it “tap water.” Explain finite amount of water, it has to be recycled, even though this is just tap water it really could be some water George or Rachel or even dinosaurs drank in the past. .

"Did you know water in most cites is recycled through sewage treatment plants. However, some pollution that gets in water is not easily removed nor detected!"

"Water and the other building materials of life are constantly recycled or reused through the earth and through our bodies that is why you should learn how to keep them (the water, air and soil) as clean as possible."

1. Post tests (conclusions): use drawings and sentences to describe what you think the water cycle is. Use arrows and words to explain your drawing. Remember - cycle means circle.

2. "Did anybody have fun? Hope you did but also hope you remember how water cycle works!"

"Your assignment to earn a Resource Keeper bead. Do something to help the water cycle!” Distribute follow up activity (synthesis of concept), and show bead they can earn.

“Please remember not to dump oil or poisons on the ground or burn garbage because they get into water and air and then our bodies through the water cycle."

"On behalf of clean water, air and soil specks or molecules who can't speak for themselves, I thank you! Goodbye!"