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I. Understanding Water

1. Activity: How Thirsty Is the Ground?

Summary: This activity helps students to understand how percolation tests are performed, the properties of different soil types, how land usage relates to permeability and the oxygen content in various soil types. Using a coffee can and soil type demonstration, students learn how fast an area absorbs surface water, and in turn how long it takes to fill watersheds and aquifers. This is a great follow-up activity on a soil composition unit and a great introduction to water contamination.

Grade Levels: 3-12

Subjects: earth science, environmental science

Source(s): Higgins, Susan and Mark Schilling (Eds.). 2003. *WOW! The Wonders of Wetlands*. Bozeman, Montana: The Water Course. p.239-44.

2. Activity: Water across the Curriculum

Summary: These activities are interdisciplinary and encapsulate many key water issues relevant to today. These activities cross over from history, mathematics, social studies, art and science, which makes them more useful and educational. There are activities dealing with water conservation, waste water treatment, water contamination, aquifers, the water cycle, sedimentation, dilution, global distribution and much more. Some of them involve measuring parts per million, researching historical events, simulating soil layers, acting out the stages of the water cycle and providing opportunities for fun field trip ideas. These activities are a great way to incorporate global and domestic water related issues into just about any part of the lesson plan.

Grade Levels: 6-8

Subjects: cross-curriculum

Source(s): Grant, Tim and Gail Littlejohn (Eds.). 2004. *Teaching Green: The Middle Years*. Gabriola Island, BC: New Society Publishers. p.102-6.

3. Activity: The Water Game

Summary: This is an outdoor game played among trees. On the trees are cards with different water forms. The students must locate the water forms while trying to evade Toxins (selected children in bright colored vests) and answer the educator's questions (playing the role as Conservative Officer) about water pollution, conservation and general facts. There are various ways to gain and earn points to achieve a different place in the hierarchy of the water cycle. This is a fun, interactive introduction to water conservation, population problems, water pollution and the importance of clean watersheds.

Grade Levels: 2-3

Subjects: science

Source(s): Grant, Time and Gail Littlejohn. 2005. *Teaching Green: The Elementary Years*. Gabriola Island, BC: New Society Publishers. p.136-40.

4. Activity: Water Models

Summary: This is an activity that teaches students about condensation and evaporation while they build a model of an ecosystem to see how the water cycle's components and

processes will work. Then students use other models of ecosystems to see whether the water cycle happens the same way in every ecosystem. This is a great experiment that teaches students about the properties of water while educating them on water cycles in different climates all over the world.

Grade Levels: 5-6

Subjects: earth science, ecology, ecology, physical science

Source(s): 1998. *Project Wet: Curriculum and Activity Guide*. Bozeman, Montana: The Water Course. p.201-5.

II. Defining a Watershed

1. Activity: Branching Out

Summary: This activity helps students understand the interconnectedness of streams, lakes, rivers and watersheds. They build a temporary or permanent landscape model, and then predict where the rain would flow. Then students make it rain colored water with a water pail to see if their predictions are correct. This is a great model because each student can create a model, and it does not require a large amount of material or space.

Grade Levels: 6-8

Subjects: earth science, geography

Source(s): 1998. *Project Wet: Curriculum and Activity Guide*. Bozeman, Montana: The Water Course. p.129-32.

2. Activity: Discovering Dips

Summary: This activity is designed for the preparation of a planned wetlands area but can be adapted to understand how water flows over the land and the geography of the school grounds. Younger students can watch surveyors at a local construction site or have a surveyor come in and demonstrate how they use their equipment. They can also make clay models of the highs and lows of their schoolyard. Older students can learn how to use the equipment and make a topographic map of the area. Pairing younger students with the older group also creates an interactive educational forum. This is a great way to begin to understand where water flows over the land and where water comes to a rest.

Grade Levels: K-4, 5-12

Subjects: science, mathematics

Source(s): Ripple, Karen and Edgar Garbisch. 2000. *POW! The Planning of Wetlands*. St. Michaels, Maryland: Environmental Concern, Inc. p.178-89.

3. Activity: Educating the Community: A Watershed Model Project

Summary: This project gives many students, teachers, volunteers and community members the chance to get involved in the learning process. The idea is to plan a scale model of the area watershed with brick, mortar, cement and a little muscle. Then paint the model according to terrestrial and aquatic landmarks. After it is completed, students can present how the watershed works with a water hose creating rainfall, streams and lakes. This is a good opportunity for cooperative education about how to educate the community and to make a lasting learning tool.

Grade Levels: 3-5

Subjects: science, social studies

Source(s): Grant, Tim and Gail Littlejohn. 2005. *Teaching Green: The Elementary Years*. Gabriola Island, BC: New Society Publishers. p.164-68.

4. Activity: Find Your Watershed

Summary: This activity is a useful introduction to a watershed, water management or water quality unit. Students learn to use city and topographic maps. They use them to locate the water source on one map and then on the other map, as well as where the contour drainage dividing line is located. They use what they know about elevation, water flow, and different local landmarks to help them outline their local watershed. This activity teaches students about watersheds and how to use one of the most widely used scientific maps.

Grade Levels: 6-10

Subjects: physical science, ecology, geology

Source(s): *Boulder Area Sustainability Information Network*:
<http://bcn.boulder.co.us/basin/learning/mappingteacher.html>

5. Activity: A Working Model of a Stream

Summary: Using the Kingfisher Stream Model created by Neil Brooks, a classroom can create a model of a stream, where it flows, how local farms and factories affect it, how far pollution travels, how to stop erosion, and the uses of dams, retention ponds and other such structures. There is an indoor and outdoor version available, but both include a sandbox with some elevation, water hose, toy houses and farm animals. With a little imagination, there are endless possibilities given for materials that can be used to create different stream elements to demonstrate local watersheds, runoff, erosion and point-source pollution.

Grade Levels: 2-5

Subjects: science, ecology

Source(s): Grant, Tim and Gail Littlejohn. 2005. *Teaching Green: The Elementary Years*. Gabriola Island, BC: New Society Publishers. p.141-44.

III. Water Management and Conservation

1. Activity: A Drop in the Bucket

Summary: This less time-consuming activity helps students understand why and how water is a limited resource on Earth. Using a liter of water to represent all the fresh water available for human consumption and then using eye droppers to disperse it appropriately, the activity ends by showing students just how little is left to distribute among the world's human population. This is a great introduction to water management, water conservation and global issues surrounding this problem.

Grade Levels: 6-8

Subjects: earth science, mathematics, geography

Source(s): Higgins, Susan and Mark Schilling (Eds.). 2003. *WOW! The Wonders of Wetlands*. Bozeman, Montana: The Water Course. p.158-61.

2. Activity: On the Edge

Summary: This activity helps students learn the challenges of managing a resource that crosses political boundaries. It teaches them about the processes of negotiation, compromise, cooperation, and decision-making by creating two “countries” and having them find a way of sharing a limited resource (candy). Certain students will take on the rolls of interpreter and negotiator. This activity teaches students about working as a team, as well as international law and water management as a whole. It works well in conjunction with or in place of other water management activities, especially among older students as they increase their knowledge of global water management issues.

Grade Levels: 9-12

Subjects: geography, history, anthropology, environmental science, government

Source(s): 2002. *Discover a Watershed: The Watershed Manager Educator’s Guide*. Bozeman, Montana: Discover a Watershed Series. p.168-72.

3. Activity: Our Watery Planet

Summary: There are several activities here that demonstrate water conservation on a global scale. There is a water bucket relay to demonstrate how people with limited resources in the world collect their water supply, a way to calculate how much water individual students use, how much fresh water is available for human consumption, how unevenly water is distributed throughout the world, how difficult it is to find fresh water and what dehydration means for developing nations of the planet. These activities are educational and interactive while providing teachers with the opportunity to fit global issues into a limited amount of time.

Grade Levels: 6-8

Subjects: science, social studies, mathematics

Source(s): Grant, Tim and Gail Littlejohn (Eds.). 2004. *Teaching Green: The Middle Years*. Gabriola Island, BC: New Society Publishers. p.98-101.

4. Activity: Pass the Jug

Summary: This activity simulates different water rights policies, water availability and how people’s proximity to the resource influences how water is allocated. This activity can be done in a classroom with a jug of water and a few cups. Using various information about the students, set up an allocation system and ask how the students at the end of the line feel about being left out. This activity illustrates the social and governmental aspects of water allocation, and can be used in conjunction with or in place of other water management activities.

Grade Levels: 6-8

Subjects: social studies, environmental sciences, history, government

Source(s): 2002. *Discover a Watershed: The Watershed Manager Educator’s Guide*. Bozeman, Montana: Discover a Watershed Series. p.100-5.

5. Activity: The Watershed Manager

Summary: This activity gives students the opportunity to construct an abstract model using a mobile to demonstrate the balance among water users in a watershed. This helps students gain an introductory knowledge of the different types of water users and the issues surrounding water management.

Grade Levels: 4-8

Subjects: natural science, environment, civics, art

Source(s): 2002. *Discover a Watershed: The Watershed Manager Educator's Guide*. Bozeman, Montana: Discover a Watershed Series. p.120-23.

6. Activity: 8-4-1, One for All

Summary: This activity shows the interconnectedness of water users in a community watershed, demonstrates the complexity of sharing this resource, and teaches them how to negotiate moving past water management challenges along the river. Using teams of students, a large working space like a gymnasium, a water jug and obstacles, students have to maneuver themselves to the end of the river to find out how much water is left over in the end. This activity also illustrates importance of the adequate amount, cost, time and quality of water. This is great for understanding the importance of watersheds and how the government must regulate the watersheds.

Grade Levels: 4-8

Subjects: government, environmental science

Source(s): 2002. *Discover a Watershed: The Watershed Manager Educator's Guide*. Bozeman, Montana: Discover a Watershed Series. p.64-71.

IV. Water Quality and Pollution

A. The Facts and Problems of Runoff

1. Activity: No Place to Run to

Summary: This activity will help students understand the concept of imperviousness and runoff absorption. They will also be able to identify urban water pollutants. Students create a model of a city using sponges as porous grassland and Styrofoam as parking lots. After pouring pollution or dyed water onto the model they see where water is absorbed, where it will run off and how it collects in drains. Students have the opportunity to redesign their model to get the best results. This can help students begin to understand how everyday pollution infiltrates local watersheds.

Grade Levels: 5-9

Subjects: science, social studies, language arts

Source(s): *Air and Waste Management Association*

2. Activity: Runoff Race

Summary: This activity is a fun contest that shows students how wetlands and other variables help filter runoff and improve water quality. Using a variety of materials on an incline, students learn how different vegetation, and soil types help slow and filter water before it enters a watershed or another ecosystem. This is a good introduction to understanding water contamination, the effects of runoff and how students can improve water quality on a large scale.

Grade Levels: 2-12

Subjects: earth science, geology

Source(s): Higgins, Susan and Mark Schilling (Eds.). 2003. *WOW! The Wonders of Wetlands*. Bozeman, Montana: The Water Course. p.210-11.

3. Activity: Snow and Tell

Summary: There are several activities available here that demonstrate snowpack and its role in the watershed, factors in snowpack runoff, snow water equivalency, and the importance of studying snow. Students make models and work with real snow to simulate the process used by the SNOWTEL system to collect data about snow. This is a wonderful activity in conjunction with rainwater runoff activities, because it lends itself to watershed curriculum in the winter months.

Grade Levels: 6-8

Subjects: physical science, environmental science, geography, mathematics

Source(s): 2002. *Discover a Watershed: The Watershed Manager Educator's Guide*. Bozeman, Montana: Discover a Watershed Series. p.79-85.

4. Activity: Will Stormwater Run Off?

Summary: This activity is designed for the preparation of a planned wetlands area but can be adapted to understand where stormwater runoff goes on the school grounds. For the younger grades, students will follow drains, outlets and downspouts to see where water flows. This same exercise can be measured with food coloring added to water poured down drains. Older students can use topographic maps and the measured water flows taken by younger students to figure out where the water ends up and how much of it reaches this point. This is a great warm-up activity for understanding how stormwater reaches watersheds and includes assessments, as well as extensions.

Grade Levels: K-4, 5-12

Subjects: science, mathematics

Source(s): Ripple, Karen and Edgar Garbisch. 2000. *POW! The Planning of Wetlands*. St. Michaels, Maryland: Environmental Concern, Inc. p.163-68.

B. Other Important Issues**1. Activity: Groundwater Cleanup Contest**

Summary: This is a simulation designed to teach students about pollution, how quickly it can infiltrate ground water, proper waste disposal, and complete contamination removal, while encouraging students to use their problem solving skills. The object is to neutralize the contamination before the pollution spreads throughout the entire aquifer (or colors the whole sponge). Students come up with an action plan to implement and then devise how to dispose of the contaminates. This quick thinking game incorporates many issues of water pollution and the challenges of keeping a watershed clean.

Grade Levels: 3-8

Subjects: science, ecology

Source(s): Lynn B. Entine and Karin E. Van Vlack. 1993. *Watersheds – Getting to Know Your Stream*. Dane County Water Watchers, Dane County Extension.

2. Activity: Home Site Checklist

Summary: Students can do this activity at home with or without a parent/guardian. Provided is a checklist to learn where the students' water comes from, in what ways it could get contaminated, how to check for contamination, how to tell if their water system is being maintained at a high level of efficiency, how to tell where they can reduce their

water usage, what to do with hazardous wastes if they are present, alternatives to salting driveways, reducing pet and yard waste, reducing runoff to streets and how to further conserve water on a daily basis. This activity can be used as a follow-up to a water management, water contamination or watershed usage unit, and it offers adults a chance to learn along with the students.

Grade Levels: 5- 12

Subjects: science, social studies, ecology

Source(s): Elaine Andrews. 1996. *Give Water a Hand Action Guide*. UWEX Environmental Resources Center, UW-Madison.

3. Activity: Nutrients: Nutrition or Nuisance?

Summary: This simulation illustrates the movement of chemicals, nutrients and energy through a water system such as a marsh or watershed. Using musical instruments, students learn how to interpret the benefits of some nutrients and dangers of other excess nutrients in a water system. They also learn the filtering ability of wetland plants. This activity addresses a problem that is often forgotten or misunderstood in terms of pollution and excess nutrients.

Grade Levels: K-8

Subjects: environmental science

Source(s): Higgins, Susan and Mark Schilling (Eds.). 2003. *WOW! The Wonders of Wetlands*. Bozeman, Montana: The Water Course. p.188-91.

4. Activity: Sum of the Parts

Summary: This activity illustrates how everyone contributes to water pollution and what everyone can do about it. Students piece together their “river front property” and then show how pollution passes down the chain of water to collect at the end. Students learn about point and non-point source pollution and responsibility for rivers and lakes, as well as how to identify Best Management Practices to reduce this pollution. This is a terrific warm-up for showing students why it is important that everyone takes responsibility for personal actions and works to maintain optimal water quality.

Grade Levels: 4-8

Subjects: environmental science, government

Source(s): 2002. *Discover a Watershed: The Watershed Manager Educator’s Guide & 1998. Project Wet: Curriculum and Activity Guide*. Bozeman, Montana: Discover a Watershed Series. P.114-18, 267-270..

5. Activity: Super Sleuths

Summary: This activity encourages students’ understanding of waterborne illnesses. They will have to identify the role of transmitting diseases and analyze the characteristics of environments that promote the transmission of these diseases around the world. They will do this by “acquiring” a waterborne illness and searching for other classmates that have similar symptoms. This is an interactive opportunity to educate students on the plight of developing nations and why water quality is important.

Grade Levels: 6-9

Subjects: health, life science, geography

Source(s): 1998. *Project Wet: Curriculum and Activity Guide*. Bozeman, Montana: The Water Course. p.107-15.

6. Activity: Water Purifiers

Summary: This activity helps students understand mechanical, chemical and natural water filtering processes. They learn the process of how their drinking water is treated for consumption, how to identify waste products of water treatment, which water treatment process is most efficient, and what human and natural resources are used in the treatment process. Students get hands-on experience with how to filter their polluted jar of water mechanically, chemically and naturally. This is a great way to connect students to the importance of their own local water quality, as well as introduce or follow-up a water contamination unit.

Grade Levels: 6-12

Subjects: environmental science, chemistry

Source(s): Higgins, Susan and Mark Schilling (Eds.). 2003. *WOW! The Wonders of Wetlands*. Bozeman, Montana: The Water Course. p.215-19.

More Information and Resources

1. Adopt-A-Watershed- Curriculum Materials Catalog and Leadership Courses at www.adopt-a-watershed.org
2. Project Wet (Water Education for Teachers) - Provides educators with teaching materials for ages 5-18 in water awareness, appreciation, knowledge and stewardship. www.projectwet.org
3. WAV (Water Action Volunteers) - WAV is a statewide program for citizens who want to learn about and improve the quality of Wisconsin's streams and rivers. WAV offers informational materials, training and support for citizen stream monitoring, storm drain stenciling, river cleanups and other projects. <http://clean-water.uwex.edu/wav/>
4. Wisconsin's DNR (Department of Natural Resources) - Dedicated to the preservation, protection, management and maintenance of Wisconsin's natural resources by implementing laws, educating citizens, coordinating disciplines and providing outdoor recreation. <http://www.dnr.state.wi.us>
5. Water Watchers (Dane County Extension) - Water Watchers offers training on water and watershed topics, provides curriculum resources and guides, and lends equipment. Water Watcher volunteers monitor stream water quality, restore stream banks, and help curb urban and rural runoff pollution. <http://clean-water.uwex.edu/wav/werclocations.htm>
6. Wellhead Protection Project - Assists homeowners and farmers to voluntarily protect groundwater. <http://www.dnr.state.wi.us/org/water/dwg/gw/whp/WHP-sum.html>