

WETLANDS & THE WATER CYCLE

NATIVE AMERICAN TRIBES OF WISCONSIN



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I. Enduring Knowledge:

An understanding of the water cycle is essential to maintaining a sound, environmental ecosystem. Students will understand how human impact on water, in the various stages of the cycle, has consequences for the health and future of the planet.

Learning Targets:

- Students are able to explain the complete water cycle from memory.
- Students know the various roles of wetlands within the water cycle.

II. Teacher Background Materials:

The water cycle, or hydrologic cycle, can be broken up into three major states:

1. **Evaporation:** The sun's energy heats the surface of lakes, rivers, plants and soil, the water begins to turn into water vapor, which is a gas that can rise up into the sky. Water vapor rises up into the sky and is picked up by winds and air currents where it accumulates into clouds.
2. **Condensation:** As the wind and air currents push the water vapor through the atmosphere, it joins with other water molecules and dust particles, which condense together into clouds. As the water vapor combines in the clouds, they make water droplets or ice particles.
3. **Precipitation:** Once the droplets of ice particles get too big, gravity takes over and the water is trapped in the cloud and begins to fall as precipitation, which can be rain, snow, hail, sleet, or anything in between. The water that falls as precipitation may flow into a nearby stream or lake, be taken up by plant roots, or infiltrate the soil and turn into ground water.

Surface water can begin to return to the atmosphere quickly through evaporation, but water that seeps into the ground may not return to the surface for years or even decades.

Plants play a role in the water cycle, as they absorb moisture through their roots from the soil and transport it to their leaves for photosynthesis. There it can evaporate back into the air.

Wetlands play a significant role in the water cycle. They can be created from rain or melting snow runoff, from rivers flooding, or fluctuations in lake water levels. Many wetlands form when groundwater in the soil is at or very near the surface.

Wetlands also serve as filters to remove impurities from run off water. This helps remove pollution from the water cycle. Wetlands also provide flood control because they are capable of holding millions of gallons of water, thus serving as buffers between surface runoff and rivers, which can reduce flooding peaks by as much as 60 percent. Wetlands also protect against erosion by acting as shallow water buffers with vegetation between open deeper waters and shorelines.

Protecting wetlands is essential to the water cycle, and thereby to life itself.

Students should begin to understand that there is a set amount of water on the earth and in its atmosphere; that is to say, no new water is ever made, it is a constant. What the implications are for human life make an interesting discussion.

Vocabulary:

1. **condensation:** a reduction to a denser form, as from steam to water
2. **evaporation:** to convert to a vapor, such as water to steam
3. **hydrologic cycle:** water cycle; the properties, distribution, and circulation of water on the surface of the land, in the atmosphere, and in liquid state (rain, snow, sleet, etc.)
4. **photosynthesis:** synthesis of chemical compounds with the aid of radiant energy and especially light; formation of carbohydrates in the chlorophyll-containing tissues of plants exposed to light
5. **precipitation:** a deposit on the earth of hail, mist, rain, sleet; or snow

III. Before Viewing the Video:

See if the students can draw the water cycle from previous studies.

IV. Viewing Guide:

Have students draw a blank circle to fill in as they view the video. Tell them to add whatever forces influence the changes in the form of water. (For example, the sun heats the water and turns it into water vapor; the winds and air currents push the water vapor through the atmosphere to form clouds.)

V. Discussion Guide:

Draw the water cycle on the board or display on computer projector screen. Ask students to fill in the various stages: evaporation, condensation, precipitation, groundwater (water found in various places on the earth's surface—rivers, lakes, streams, underground).

Discuss the importance of wetlands in keeping groundwater free of pollution, their role in flood control.

Talk to the students about groundwater and what human activities affect the quality of the water. (Pollution from run-off of farms, cities that pave over large portions of the lands, pouring chemicals, like used motor oil, on the ground, other sources of water contamination as you see fit [for example, what are the effects of chemical fertilizer, pesticides, etc.]).

VI. Evaluation:

- Collect the water cycle drawings from each student and check for understanding.
- Creating a student project (or group projects) offers an opportunity to assess:
 1. group participation, if projects are in small groups,
 2. quality of finished projects (use a rubric designed by the class, including “neatness, interesting graphics,” etc.),
 3. quality of ability to share information in a verbal presentation.

Suggestions for extended learning:

Students could do a survey of wetlands, rivers, streams, etc., in their community. Advanced students might want to take samples from various groundwater sources and have them tested. A high school chemistry lab or the state extension office might have the means to do this.

- Students could make a study of areas on the globe where clean, fresh water is in short supply. What are the implications of lack of water?
- Students could study water sources in their town or in an area they find interesting. For example, where does water come from in large, desert cities like Las Vegas or Los Angeles? If their community does not have its own wells, where does the water that they use come from?
- Students could monitor their own water usage at home. Find out how much water is used in dishwashers, various kinds of showers and baths, toilet fixtures, etc. After they do the research, have them develop a water saving plan for their families.
- Some students may be able to construct a closed water cycle demonstration; boil water, cause condensation, etc.

The following Wisconsin Student Proficiency Standards can be met teaching *Wetlands & the Water Cycle*:

SCIENCE:

CONNECTIONS:

How evidence explains phenomena

INQUIRY:

Understanding how questions direct research

EARTH SCIENCE:

Earth history & structure of earth

SOCIAL STUDIES:

GEOGRAPHY:

“Students in Wisconsin will learn about geography through the study of the relationships among people, places, and environments.”

A.8.4; A.8.6; A.8.8; A.8.11

ECONOMICS:

“Students in Wisconsin will learn about production, distribution, exchange, and consumption so that they can make informed economic decisions.”

D.8.11

Wisconsin Teacher Standards which can be met with this curriculum, including rationale:

Standard 1: Subject matter. This curriculum provides suggestions to extend information on the topic, which will enhance the teacher’s information about the subject matter.

Standard 3: Adapt instruction. The curriculum provides suggestions for learners with a variety of intelligences and levels of ability, particularly in the extended learning sections.

Standard 4: Instructional strategies. The curriculum includes the use of technology to gain information and suggestions for using research in extending learning.

Standard 5: Individual and group motivation. This curriculum involves cooperative learning, active learning, and prior knowledge.

Standard 6: Verbal and nonverbal communications. Instructional media and technology that promote active learning are key parts of this curriculum.

Standard 7: Organizes and plans systematic instruction. The curriculum is organized to support teacher knowledge, to draw on and motivate students to engage in active learning, and promotes active inquiry, collaboration, and supportive interaction in the classroom.

Standard 8: Formal and informal assessments. Suggestions for a variety of assessments, both formal and informal, are offered in the curriculum.