



California Project WET Gazette

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ARTICLES

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STATES OF MATTER

Water is an amazing substance. It is so easy to forget this in our modern era of plumbing and on-line realities, where we can insulate ourselves from the world and receive water anytime with just the twist of a knob. But winter has a way of reminding us the full glory of water in all its variations from the electric sting of precipitation down the neck to the cacophonous roar and gurgle of a downpour bouncing off rooftops and bursting forth from downspouts. It is enough to snap the most diehard addicts from their electrically generated fog, even if it is initially just an instinctual reaction to save their device. But for those willing to remain logged into the world of reality on a cold winter day, the season is likely to bring back childhood memories of playing in this grand world of changing states of matter when water seemed magical. The crack and pop of ice on a puddle in response to a shoe or rock, followed by the glass like clink as sheets break into shards with the flip of a wrist. The crunch underfoot of heavy frost or new fallen snow - or the 'plop' of a shoe entering mud. The muffled silence of falling snow or steady pitter-patter of a light rain can lull listeners to the land of dreams and imagination. So too the silent chill as one stands in a dense veil of ghostly tulle fog wondering if some creature of legend or Arthur and his knights may emerge from the mists. Then of course there is that irresistible urge of young and old alike to exhale steaming cones of breath like Godzilla entering the harbor, trace patterns through vapor condensed on glass and flick stray bits of debris into the stream bubbling down the gutter to watch them disappear in the nearest storm drain. Winter is a wonderland for kids and full of opportunities for educators to fuse the arts and sciences using the natural curiosity generated by the season.

Some of my earliest memories of school are of making paper snowflakes, floating milk carton boats across the schoolyard and a few of the memories written above – and only the snowflake was a classroom activity. Bring those outside experiences and the questions they may generate in the classroom with *'A House of Seasons' (Project WET Portal)*, an activity that begins a fun visual art project assessing student awareness of water through the changing seasons before morphing into a language arts activity introducing students to science observation and journaling skills as they create a *'book of seasons.'* This record of personal examples with the various states of water from their adventures outside can be used as the class simulates the movement of water molecules in response to changing temperatures in *'Molecules in Motion' (Project WET, p: 33)*, focus on sensory awareness skills while simulating sounds of *'The Thunderstorm' (Project WET, p: 209)* or engaging in a card game on states of matter and the variations

water can take three states water can take in *'Water Match' (Project WET Portal)*. The paper snowflake was merely a holiday art project in my childhood, but it becomes a language and visual art activity focused on all the forms water can take in the K-3 adaptation of *'Water Inspirations' (Project WET, p: 541)* – and a wonderful activity to assess student understanding before, after or in tandem with any of the activities above. The lower elementary adaptation of *'Rainy Day Hike' (Project WET Portal)* provides another opportunity to indulge a bit of play and student curiosity by suggesting students can learn the flow patterns by making and then observing the flow of small boats on the school grounds. Look in the **'Websites of Interest'** for a link to a variety of designs and directions for simple boats kids can make.

Whether frozen, flowing or steaming the movement of water – or lack thereof – and how it moves from place to place is another source of curiosity. *'The Incredible Journey' (Project WET, p: 155)* turns students into water molecules investigating the complexities of the water cycle, including a detailed look at how and in what form water would move from each planetary water reservoir. It may help the class better visualize these relationships by integrating the visual and language art techniques in *'Idea Pools' (Project WET, p: xxiii)* to categorize and map the student answers, while assessing their knowledge and perceptions and providing a pool of knowledge that all can use in writing the story of their journey through the water cycle. *'The Incredible Journey'* includes a suggested extension challenging students to compare the movement of water during different seasons and different locations around the world, which flows perfectly into a simulation of seasonal stream flow in a watershed *'Blue River' (Project WET, p: 135)*. It would also be a great extension to *'Discover the Waters of Our National Parks' (Project WET, p: 493)*, with students investigating the effect of seasons on the waters of an adopted park by season through data and pictures. Of course, a comparison of the movement of water during different seasons and different locations around the world would not be complete without looking at the links to language. *'Raining Cats and Dogs' (Project WET, p: 521)* is a wonderful activity studying the influence of water on language and the links between cultural literacy and climates – and check with **'Websites of Interest'** for a great website to use with this activity!

There comes a time when students will start to question why water is so special and how learning about it has anything to do with the here and NOW! Engaging students in simple experiments studying the adhesive and cohesive properties of water in *'H2Olympics' (Project WET, p: 30)*, the effects of temperature and pressure on water density in *'Adventures in Density' (Project WET, p: 3)* or hydrogen bonding and polarity in water molecules in *'Hangin Together' (Project WET, p: 19)* will allow them to rediscover for themselves why water is such a unique substance – and tasking them with finding evidence of these water properties at work in outside is an added reinforcement. Student knowledge of water properties can be put to the test in a number of other Project WET activities including *'Snow and Tell' (p: 387)*, where students build a model to investigate factors affecting snowpack. This activity keeps with the winter theme, but also links directly to the hot concerns regarding the current California snowpack and water next year and research on the future snowpack in a changing climate. Combine *'Snow and Tell'* with *'Blue River' (Project WET, p: 135)* to investigate how seasonality can impact stream flow and water quality, then have students create hydrographs using data from a USGS annual report for a river in your area – the reports note major hydrological changes and break the data accordingly, allowing users to study the effects of seasonality, dams and longer term trends within a watershed.

The investigation of snowpack, seasonality and climate is a perfect lead into *'Piece It Together' (Project WET Portal)*, an activity beginning as an earth science activity investigating global temperature and precipitation data to determine climate patterns, then veers into the realm of geography studying how these factors influence human lifestyle. The activity provides an excellent bridge to connect study of local climates to the world-wide picture, while helping students understand the relevancy of the science and social science concepts they are learning in the Middle and High School grades. *'Piece It Together'* also provides an opportunity to link back to the influence of ocean currents on climate patterns introduced to students in *'Adventures in Density' (Project WET, p: 3)* – again, very relevant to the human history being studied from the settling of Europe by early humans to Polynesian colonization of the Pacific. Other ties to the Language and Visual Arts are embedded in the student led performance simulations on water

properties in *'Hangin Together,'* the literature excerpts in *'Adventures in Density'* and with students studying the influence of water in all its forms on great art and literature through time in *'Water Inspirations'* (*Project WET, p: 535*), which links concepts in science, language arts and history.

Yes, for those who have been reading the newsletter for a while a similar article did appear in the Winter 2010 Gazette that zeroed in on the opportunities for science provided by the winter season. But the season is also a great opportunity to engage and integrate student knowledge and skills across subject areas, an interdisciplinary approach encouraged by Common Core State and Next Generation Science Standards that I hope has been demonstrated in this article. Please explore the *'Websites of Interest'* for some wonderful links to use with specific Project WET activities. If you have not yet updated your Project WET training, you'll find a list of workshops coming up as the New Year begins in *'Professional Development Opportunities'*. Please visit the [Water Education Foundation](http://www.watereducation.org) website to find additional workshops in the New Year or e-mail me at projectwet@watereducation.org if you would like to be notified of workshops closer to home!

WEBSITES OF INTEREST

The Poetry Foundation

<http://www.poetryfoundation.org>

The Poetry Foundation is an independent literary organization committed to a vigorous presence for poetry in our culture. It exists to discover and celebrate the best poetry and to place it before the largest possible audience. The Poetry Foundation works to raise poetry to a more visible and influential position in American culture. The Foundation seeks to be a leader in shaping a receptive climate for poetry by developing new audiences, creating new avenues for delivery, and encouraging new kinds of poetry. A wonderful resource for use with *'Water Inspirations'* (*Project WET, p: 535*) or *'Poetic Precipitation'* (*Project WET Portal*) including a list of water poems: <http://www.poetryfoundation.org/search/?q=water>.

Artists Helping Children

<http://www.artistshelpingchildren.org>

A website dedicated to helping parents and educators find simple art and craft projects to do with kids – including instructions at the link below for building simple boats to use with the K – 2 adaptation of *'Rainy-Day Hike'* (*Project WET, p: 169*) or to provide more structure for the engineering portion of *'Water Crossings'* (*Project WET, p: 487*) Find out how to make your own boats, rafts, canoes and ships at: <http://www.artistshelpingchildren.org/boats-ships-craftsideasactivitieskids.html>

Cambridge International Dictionary of Idioms

<http://idioms.thefreedictionary.com/water>

The Cambridge International Dictionary of Idioms explains over 7,000 idioms current in American, British and Australian English, helping learners to understand them and use them with confidence. The Cambridge Dictionary of American Idioms, based on the 200 million words of American English, unlocks the meaning of more than 5,000 idiomatic phrases used in contemporary American English. Full-sentence examples show how idioms are really used. The link is to a list of water idioms that can be used to extend or expand the activity *'Raining Cats & Dogs'* (*Project WET, p: 521*).

River of Words

<http://www.stmarys-ca.edu/center-for-environmental-literacy/river-of-words>

River of Words® (ROW) is a program of The Center for Environmental Literacy committed to teaching the art and poetry of place to young people. Since 1995, River of Words has encouraged young people to explore and savor the watersheds where they live and trained educators to guide them with inspiration and passion. For more information please contact Pamela Michael, River of Words co-founder and director of Saint Mary's Center for Environmental Literacy, at pm7@stmarys-ca.edu or 925-631-4289.

Weather Wiz Kids®.

<http://www.weatherwizkids.com>

Welcome to Weather Wiz Kids®. Meteorologist Crystal Wicker designed this website especially for kids

to allow them to learn more about the fascinating world of weather. It's also a wonderful educational website for teachers and parents to give them the right tools to explain the different types of weather to children. The website includes instructions to a number of simple weather-related experiments students can do at home or in the classroom: <http://www.weatherwizkids.com/weather-experiments.htm>

BioEd Online

<http://www.bioedonline.org>

Welcome to BioEd Online, the online educational resource for educators, students, and parents. BioEd Online utilizes state-of-the-art technology to give you instant access to reliable, cutting-edge information and educational tools for biology and related subjects. Our goal is to provide useful, accurate, and current information and materials that build upon and enhance the skills and knowledge of science educators, including helpful techniques for how to teach the lesson, "What Is the Water Cycle?" in which students create and investigate a simple model of the water cycle – a great extension to *'The Incredible Journey'* <http://www.bioedonline.org/videos/lesson-demonstrations/ecology/water/what-is-the-water-cycle>

Nature's Notebook

https://www.usanpn.org/natures_notebook

Nature's Notebook is an off-the-shelf program appropriate for scientists and non-scientists alike, engaging observers across the nation to collect phenology observations on both plants and animals. Nature's Notebook gathers information on plant and animal phenology across the U.S. to be used for decision-making on local, national and global scales to ensure the continued vitality of our environment. Scientists alone cannot collect enough data: They need your help. Join more than 6,000 other naturalists across the nation in taking the pulse of our planet.

USA National Phenology Network

<https://www.usanpn.org>

The USA National Phenology Network serves science and society by promoting broad understanding of plant and animal phenology and its relationship with environmental change. The Network encourages people of all ages and backgrounds to observe and record phenology as a way to discover and explore the nature and pace of our dynamic world. The Network makes phenology data, models, and related information freely available to support a wide range of decisions made routinely by citizens, managers, scientists, and others, including decisions related to allergies, wildfires, water, and conservation.

USGS: Water Science for Schools

<http://ga.water.usgs.gov/edu>

Welcome to the [U.S. Geological Survey's](http://www.usgs.gov) (USGS) Water Science School. We offer information on many aspects of water along with pictures, data, maps, and an interactive center where you can give opinions and test your water knowledge. Check out the updated, interactive water cycle diagrams developed for specific grade levels (<http://ga.water.usgs.gov/edu/watercycle-kids-adv.html>) and the easy to explore page for adults and kids alike to find more information on the always changing forms and properties of water: <http://ga.water.usgs.gov/edu/waterproperties.html>

National Water Information System: Mapper

<http://maps.waterdata.usgs.gov/mapper>

Mapper allows users to locate and retrieve data from approximately 1.5 million active and inactive stream gauges sites in all 50 States. You can find current and historical data on stream flow (discharge), temperature, specific conductance, pH, nutrients, pesticides, and volatile organic compounds for streams throughout California – information that can be used with *'A Snapshot in Time'* (p: 377) and as a comparison for a World Water Monitoring Challenge event. One can also find links to annual stream reports that date major flow changes to a stream and break the flow data accordingly, allowing students to graph and interpret the changes as a fantastic extension to the *'Blue River'* (p: 135) activity!

Climate Change Expedition

<http://epa.gov/climatechange/kids>

Get your passport ready! It's time to go on a trip around to world to explore the effects of climate change. Part of the EPA website on climate change designed for students, the Climate Change Expedition could

be used with the activity *'Piece It Together' (Project WET Portal)*. Students take a virtual journey to a number of locations around the world and watch a short video at each stop to learn about the effects of climate change. <http://epa.gov/climatechange/kids/expeditions/index.html>

CREEC Network

<http://www.creec.org>

Find additional grants, professional development and student learning opportunities on the California Department of Education's new and improved way for teachers to connect to exploratory, place-based, and environmental education instruction for students from pre-K through high school! With this site, we can help you easily access local student programs aligned to content standards and quality STEM instruction, as well as professional development opportunities that further support our collaborative educational endeavors.

Project WET Portal

<http://portal.projectwet.org>

Have you used the code on Project WET Guide 2.0 to access the Portal? Portal users now have access to the 46 additional Project WET activities from the original guide, including *'Water Log'* – an activity that will guide educators and students unfamiliar with using journaling through your first experience and set-up a language arts tool for students to use in recording observations, experiment data and the results of simulations results in most of the activities mentioned in this article.

Water Facts & Fun

<http://www.water.ca.gov/education/wffcatalog.cfm>

Lots of free materials for California educators, including *'The California Water Works'* that has a colorful comic book character, Professor Goodwater, leading students through the water cycle, showing them how water is delivered through California's built and natural water systems to the end users. Guidelines for water conservation are provided as well.

If you would like more information on Project WET please contact Brian Brown, California Project WET Coordinator at: projectwet@watereducation.org or (916) 444-6240.

Check our website www.watereducation.org and/or contact us for updates.