

Journal Entry Article

Water Agencies: An Untapped Resource for Educators

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Abstract

Water agencies have been providing educational resources to educators for many years as part of their outreach programs. Unfortunately, it still hasn't gained as much traction to allow all educators and students to take advantage of the Free resources that many water agencies offer. As educators feel overwhelmed by an even more demanding job – resources such as those from water agencies to reinforce learning about water only makes sense. Resources that include field trips, activities, lesson plans, and so many other useful ways to engage water agencies to real life situations is worth looking into.

I will start off by saying that before I worked at a water agency – I also did not know anything about what water agencies offered in the educational outreach arena. Also, I don't pay my bill to an actual pumper or agency; my water bill is paid to the city that I reside in. I thought water agencies just ensured that when I opened my faucet the water that flowed out was clean and plentiful. Fast forward to me getting hired at a groundwater agency I discovered a whole new world that I wish I had known about when I was teaching.

I work for the Water Replenishment District or better known as (WRD) it is the largest groundwater agency in the State of California, managing and protecting local groundwater resources for over four million residents. WRD's service area covers a 420-square-mile region of southern Los Angeles County, the most populated county in the United States. The 43 cities in the service area, including a portion of the City of Los Angeles, use about 250,000 acre-feet (82 billion gallons) of groundwater annually which accounts for approximately half of the region's water supply. WRD ensures that a reliable supply of high-quality groundwater is available through the use of recycled water and stormwater capture. WRD is responsible for monitoring and testing groundwater throughout the region using effective management principles.

WRD operates a robust water education program focused on education about groundwater resources and conservation efforts. The education program traditionally includes in-person workshops in classroom settings and field trips to WRD projects for hands-on instruction for visual learning experiences for grades pre-k through college and Since the pandemic began WRD had to stop in-person field trips and has been providing "virtual" field trips, tours, and classroom visits.

One of our most popular tours is of the Albert Robles Center for Water Recycling and Environmental Learning better known as ARC. (ARC) is located in the City of Pico Rivera on a 5-acre lot. It is a multipurpose and multi-benefit site which encapsulates the Water Replenishment District's commitment to the community through the construction of a state-of-the-art Advanced Water Treatment Facility, a fully digital Learning Center, and a Demonstration Garden.

ARC Treats 14 million gallons of water per day, the facility is the cornerstone project of WRD's Water Independence Now (WIN) program which created a locally sustainable water supply for groundwater recharge. This meets 50% of the water demands for over 4 million residents in WRD's 420-square-mile service area located in southern Los Angeles County.

ARC's Education Center features 33 bilingual Interactive Exhibits. They support the Next Generation Science Standards; As visitors tour ARC they are engaged by going through a Giant water drop and faucet prompting one to think about "where their water comes from, when one opens the faucet?"

Topics Visitors will learn about are:

- [Where does our water come from?](#)
- [Water Quality Issues and Mitigation](#)
- [How do people use water?](#)
- [Water Management](#)
- [Water Conservation](#)
- [What does WRD do?](#)
- [How is wastewater treated?](#)
- [About WRD](#)
- [How is recycled water used?](#)

A few of the exhibits classes or groups will tour in-person or virtually are:

The Aquivator is an Interactive experience allowing explorers to see what the sediments look like beneath Los Angeles. The "aquivator" will virtually "descend" while projecting encounters with aquifers, aquitards, fossils, water, and wells.

The Conservation Wall is a Sculptural display combining all residential uses (indoor and outdoor). Projection displays ways to conserve water.

The Fate of Rain is a Physical interactive demonstrating the impact human development has on infiltration and groundwater recharge. Explorers are able to push down on a handle and prompt rain onto the city-scape; while three panels demonstrate the fate of rain which are stormwater catch basins, bioswales, and Infiltration into groundwater. This exhibit Prompts vocabulary such as, permeable/impermeable surface, basin, bioswale, and pollution)

The Permeability and Porosity Tubes are a Physical interactive that demonstrates how groundwater flows through different media and conveys why larger grained sediment units are defined as aquifers and utilized for groundwater production and storage.

The Natural Water Cycle Displays the natural cycling of water (Precipitation, Infiltration, Evaporation, Condensation)

The WRD Service Area Map is a Digital and projected interactive that allows visitors to explore spatial data about WRD's management of the groundwater basins. It features WRD Service area's divisions and cities, water treatment and recharge facility locations, well locations including production wells, monitoring wells, injection wells, groundwater basins and forebays, Newport-Inglewood Uplift, freeways and major roads, watersheds and surface water bodies.

The Human Body- Sculpture is a projected graphic showing the percent of the human body made of Water. On a display you read a few facts such as - You can survive only 3 weeks without food; You can survive only 3 minutes without air; You can survive only 3 days without water.

The Treatment Building- has 3 Balcony overlooks- Each balcony has a digital screen demonstrating the technical process, lists of contaminants removed at each stage, physical cutaways to demonstrate the inside of each piece of equipment.

Ultrafiltration: Pre-Treatment- The UF process uses micro-sized filters to remove most bacteria, fine particles, and sediments; provide suitable water for the small membrane size in the Reverse Osmosis (RO) system. Process uses hollow fiber membranes, which filter from the outside of the fiber to the lumen.

The 2nd stage is Reverse Osmosis- The RO process uses thin film membranes and removes organic material, most viruses, pesticides, salts, ions, most viruses and organic material. There are 8 trains with a total of 468 vessels. This process removes over 99% of contaminants.

The 3rd stage is Ultraviolet Advanced Oxidation Process (UVAOP) uses Sodium Hypochlorite and UV Light to break the chemical bonds of contaminants that may pass through such as viruses, pharmaceuticals, carcinogens, personal health care products, and industrial additives.

The San Gabriel River Model explores the roles of water in Earth's surface- water is found in the ocean, rivers, lakes, and ponds. Demonstrates water runoff, pollution, predictable rivers, inflatable dam, WRD's spreading grounds, and infiltration.

The Demonstration Gardens allows visitors to explore the trails through the gardens that feature an array of plants for Eco Gardener classes, an amphitheater, a monarch butterfly garden, a working model of the San Gabriel River, roof top garden, stormwater capture system such as permeable pavement and bio-swales)

These exhibits are not only esthetically pleasing but they correlate with the standards. They allow for students to close the learning gap with reading and actually seeing the exhibits in person to better understand what they learned in the classroom.

Other resources and outreach that water agencies might offer are:

- Annual Student Art Calendar Contest
- WRD Eco Gardener Program
- Eco Kids Programming
- Story Time with a WaterNerd
- Take Home Activities:
 - o WaterNerd fan with conservation tips
 - o water conservation-rock painting kit
 - o water filtration kit
 - o water conservation bracelet

Water agency outreach also includes participation at Career, health, and science fairs. Besides working with schools, they also enjoy working with the Girl Scouts and Boy Scouts and provide them with a WATER NERD Patch once they complete a water conservation activity.

Topics that are most requested to present in the classroom or a group of students are water conservation, recycled water, the water cycle, and have live water activity demonstrations.

Many websites have links to a Teacher's Lounge that shares our passion for water and water education with teachers and students of all ages! Many education programs offer an array of programs featuring interactive student activities that touch on interesting topics such as the importance of groundwater, water treatment, and resource conservation. You can find online activities that reward visitors with a WaterNerd certificate and water conservation items such as 5-minute shower timers, pencils, and eraser.

As I know most of my article is based in California and focused in the southern Los Angeles County, but I would be doing all the readers a disservice if I didn't encourage you to look at your local water agency and see what they have to offer. I also went ahead and listed a few below to get you started. There are other complementary ways to engage students in learning about water if you have no local agencies that offer these resources. Many are able to help virtually or have wonderful online resources that can be used to help your students learn, such as my data NASA. The resources that can be found on MY NASA have been very instrumental in my job as a tour guide at a treatment facility- I have used many of their lesson plans to culminate the tour for an even better understanding.

Resources for those out of the state of California:

Think Earth - *Think Earth's* mission is to help communities create and maintain a sustainable environment through education. They seek, initiate, and oversee environmental projects and partnerships among stakeholders from the business, education, government, and public sectors. These partnerships result in tangible ways for people to *Think Earth*, that is, for people to:

- conserve natural resources
- reduce waste
- and minimize pollution

Project WET (WATER Education Today)- provides activities that are designed to be easy to use to complement existing curricula rather than displace or add additional concepts. Activities fulfill objectives and educational standards in the sciences, as well as other disciplines, from fine arts to health.

Florida Department of Environmental Protection- <https://floridadep.gov/water-topics>

City of Chicago - [City of Chicago :: Water Treatment Education](#)

Louisiana Water Company - [Customer Knowledgebase - Louisiana Water Company](#)

Colorado Division of Water Resources- [Home | Division of Water Resources \(colorado.gov\)](#)

I hope that after reading this article you have learned that as an educator you are not alone-the purpose of this article is to highlight how to find resources that complement the standards and allow students to really capture the in-classroom lesson with some real-life experiences. Not only do teachers benefit from the resources but students might find a career they had no idea existed. Forming a partnership with a local water agency only builds a stronger community.

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Resources

Customer Knowledgebase - Louisiana Water Company. (n.d.). Louisianawater.com. Retrieved December 30, 2022,

from <https://louisianawater.com/customer-knowledgebase.html>

Data, M. N. (n.d.). *Lesson Plans.* My NASA Data. Retrieved December 30, 2022, from

<https://mynasadata.larc.nasa.gov/earthsystem/lesson-plans>

Education, N. (2014, May 28). *Microgravity Lesson Plans.* NASA.

<https://www.nasa.gov/audience/foreducators/microgravity/lessons/index.html>

Home | Division of Water Resources. (n.d.). Dwr.colorado.gov. <https://dwr.colorado.gov/>

Home. (n.d.). Thinkearth.org. Retrieved December 30, 2022, from <https://thinkearth.org/>

Project WET Foundation | Water Education for Teachers. (2019). Projectwet.org. <https://www.projectwet.org/>

Water Replenishment District. (n.d.). Www.wrd.org. Retrieved December 30, 2022, from <https://www.wrd.org/>

Water Topics | Florida Department of Environmental Protection. (n.d.). Floridadep.gov.

<https://floridadep.gov/water-topics>

Water Treatment Education. (2019, May 6). Chicago.gov.

https://www.chicago.gov/city/en/depts/water/supp_info/education.html

