



# California Project WET Gazette

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## **The Liquid Gold of California...**

Life is re-emerging in the Sierra Foothills with a break in the winter storms that have pelted the state with rain and snow over the past months. Wildflowers are bursting forth in swathes like a rainbow of colorful foams in a great, green sea of grass. Spring also brings the return of tourists to these rural counties lured by flowers, wineries and the prospect of seeing a nugget of mineral wealth. Natural chasms and hard-rock mines tunnel under the former Mother Lode region, where one can take a tour into the basement of the Sierra Nevada- and a leaky basement it is at this time of the year. These underworld realms turn into subterranean opera houses every Spring, as water droplets drip into these chambers by the hundreds to create an icy crescendo echoing in the darkness. Unfortunately, I suspect as the treasure trove of minerals catch the eye in these sites, quite a few visitors fail to realize the true wonder and value of this music below. Each falling droplet began its journey by first percolating into the soil above and then followed root channels, pore spaces and cracks in the rock to reach these caverns- this is groundwater recharge in action! Yet, as they grumble about the discomfort and thankfully re-emerge into the warm sunlight of Spring, I'd bet most fail to realize they are walking out with a bit of the real wealth of the State- water is without a doubt California's liquid gold.

California has received an estimated 105% of our average precipitation as of the March 1<sup>st</sup> update from the California Department of Water Resources ([http://cdec.water.ca.gov/snow/misc/water\\_cond](http://cdec.water.ca.gov/snow/misc/water_cond)), yet unlike in the Sierra caverns hundreds of thousands of acre-feet of that water has flowed off our urban landscapes as stormwater run-off. In discordance with the natural system, we have covered our urban areas with impenetrable surfaces designed to rapidly shed water, reducing the risk of flooding, but reducing recharge of our groundwater aquifers. Rather than percolating back into the ground water instead washes off roofs, roads and parking lots, delivering a toxic brew of oils, gas, pet waste and contaminated sediments to our waterways with each passing storm. It seems crazy in a drought-plagued state to not find a better way to use this golden opportunity from above- and thank goodness there is a solution that can address both issues, while reducing water bills and providing an excellent educational opportunity for schools and homeowners- rainwater gardens.

According to a Contra Costa Times article last August, studies on urbanized areas of Southern California and Bay Area estimate *'capturing more of this rainwater at residential and commercial sites could net more than 400,000 acre-feet of water a year, enough to supply two-thirds of the water used annually by the city of Los Angeles. If government and industrial sites were added to the equation, the water savings projection for those regions alone would increase by another 75,000 acre-feet annually. Hundreds of thousands more acre-feet of water are likely available if the rest of the state is factored in.'* Many urban water agencies are offering rebates and other incentives to homeowners, schools and other organizations for barrels, cisterns and other rainwater harvesting systems. However, rainwater gardens not only reduce stormwater run-off, they also increase water percolation into the soil- and provide excellent educational opportunities for classrooms and service learning programs.

Questions about rainwater gardens and the use of Project WET activities to help students learn about these systems and the issues they are designed to address have been flowing into my office over the past several months, and the *'Websites of Interest'* section of this Gazette represents what I hope is the cream of the crop of the links I have received from educators, water agency outreach coordinators and WET Facilitators on rainwater gardens and other water capturing systems.

Rainwater gardens are designed to address the issues of non-point source pollutants and increasing percolation of water into the ground. *'Sum of the Parts'* (p: 267), *'Branching Out!'* (p: 129) and *'Amazing Water'* (p: 219) are all Project WET activities that help students understand the impact of *point* and *non-point source* pollutants, trace the flow of stormwater from their homes and schoolyards to local waterways and learn about *Best Management Practices (BMPs)* that can be used by schools and at home to protect and conserve our water resources. *'Thunderstorm'* (p: 196) helps students understand how rainfall data is collected by a monitoring system of rain gauges, then used to create an iso-hydrate map over a given area to calculate rainfall amounts. *'Color Me A Watershed'* (p: 223) provides students with a hands-on activity demonstrating the impact of urbanization on watershed run-off totals over time- and the easy access to Terra Server or Google Earth maps and rain gauge data allows tech savvy teachers a great opportunity to apply student skills to calculate rainfall and run-off estimates in their own backyard.

The location of a rainwater garden is a key factor in its effectiveness in reducing run-off and increasing water percolation into the ground. *'Rainy-Day Hike'* (p: 186) gets students out on the schoolyard mapping, analyzing and estimating the flow of stormwater from the grounds. *'Wetland Soils in Living Color'* (p: 212) helps students understand the interplay of color, texture and other soil properties that lead to wetland soil conditions- and gives them a basic tool to analyze areas of the schoolyard exhibiting similar infiltration or drainage issues. Finally, *'Get the Groundwater Picture'* (p: 136) has students observing how the porosity of common aquifer materials affects water infiltration rates, giving them an important clue as to how to increase the ability of school soils to adsorb run-off when the time comes for designing the garden. The activity also introduces students to the components of an aquifer and helps them understand how actions on the surface impact the aquifer below.

Rainwater gardens are NOT wetlands, but they do incorporate some elements of these natural systems and it may be helpful for students to study these natural systems. *'Capture, Store and Release'* (p: 133) has students investigating how wetlands capture, store and release water. *'People of the Bog'* (p: 89) includes plans for building a classroom bog in an aquarium for use with older students and gives students an up close and personal look at aerobic and anaerobic conditions that can be generated in these ecosystems... Believe me, one whiff of an anaerobic condition will immediately drive home the point for students why one would want to maximizing soil infiltration rates to eliminate any possibility their rainwater garden can generate such conditions!

Finally, the ideal plants in a California rainwater garden should be able to handle the annual summer drought in our Mediterranean climate. *'Life in the Fast Lane'* (p: 79) helps students learn the benefits of and challenges to organisms living in temporary wetlands, giving them knowledge that can be used to predict what will be able to live in their rainwater garden. The rainwater garden also provides a great opportunity for older students to apply their knowledge of water and soil quality testing to issues of relevance- What is the quality of water being captured and does it change over time? Does the concentration of run-off change soil chemistry over time? And how does this water impact the plants in the rainwater garden? The activity *'Where Are The Frogs?'* (p: 279) focuses on acidic waters, but it could be easily modified to study the potential impact of stormwater run-off on the soil and plants in a rainwater garden.

Gold may have sparked the foundation of modern California, but water and our ability to use it wisely will determine our future. I encourage you to visit the *'Websites of Interest'* in this Gazette for many excellent links on how to design, build and further integrate a rainwater garden- and other rainwater harvesting systems- into your school program. I also encourage those working with Service Learning programs to consider the potential value of these projects to help your communities conserve water and reduce stormwater contamination of local waterways- and note that each activity listed in this article

focuses on building skills and a working knowledge of ecosystem functions applicable to cross- curricular studies and future careers. Hope you enjoy a wonderful, water- filled Spring!

## WEBSITES OF INTEREST

### THE URBAN WATER CYCLE

<http://www.raingardennetwork.com/urban.htm>

This link leads you to an excellent graphic overview of how the natural cycling of water is changed over time by urbanization ready for use with the Project WET activity '*Color Me A Watershed*' (p: 223). The rest of the website is loaded with great information on the value of rainwater gardens and how to create a variety of rainwater harvesting systems.

### DIXIE SCHOOL RAIN GARDEN

<http://dixieschoolraingarden.blogspot.com/>

In fall of 2007, the landscape architecture firm of April Philips Design Works, Inc. and the landscape construction company of Cagwin & Dorward, in conjunction with Dixie Elementary School and numerous donors and volunteers, completed a Rain Garden in the drop off loop at Dixie Elementary School in San Rafael, California. The project is a demonstration garden that educates the students and community about ecology, sustainability and advances sustainable landscaping industry practices...

### YOU TUBE: RAIN GARDEN OVERVIEW

<http://www.youtube.com/watch?v=JIScj9yN6Jw>

Produced by American Rivers, this 11 minute video gives a good visual overview of the value of a rain garden in absorbing stormwater run-off from impervious surfaces such as roofs and parking lots. The program is set in Michigan and focused on protecting the Great Lakes, but the information is just as valid for urban areas across the country.

### UCCE RAIN GARDENS

[http://www-cs qc.ucsd.edu/BOOKSTORE/Resources/GS3%20Rain%20Gardens\\_8-10-09.pdf](http://www-cs qc.ucsd.edu/BOOKSTORE/Resources/GS3%20Rain%20Gardens_8-10-09.pdf)

This *Green Sheet* produced by California Sea Grant and U.C. Cooperative Extension provides rain garden information specifically for the Southern California homeowner. It will get you started constructing a home rain garden. *See the Resources section on page 4 for more details and related information.*

### PLANTNATIVE

<http://plantnative.com>

PlantNative is dedicated to moving native plants and nature-scaping into mainstream landscaping practices. We believe this promotes biodiversity, preserves our natural heritage, reduces pollution and enhances livability. Our goal is to work with nursery owners, landscape professionals and consumers to increase public awareness of native plants and related landscaping practices and to increase both the supply of and demand for native plants.

### RAINWATER CALCULATOR

<https://www.whollyh2o.org/rainwater/rainwater-res/item/65-rainwater-collection-potential.html>

Remember, for every inch of rain, about 600 gallons of water can be collected per 1,000 square feet of surface collection area. Use our rainwater harvesting calculator widget (on this page in the right hand column) to determine the amount of water you can recover from your roof and other surfaces during an average year's rainfall.

### CATCHING WATER

<http://www.edibleschoolyard.org/journal/page/2/>

Last winter, in the Edible Schoolyard garden, the 6th and 7th grade students installed a rainwater catchment system that can hold up to 6,000 gallons of water. From October to May, which is our rainy season in Berkeley, we captured and stored over 5,000 gallons of water. Our students calculated that for every inch of rain that falls we will have 200 gallons of water...

### WATER SAVING HERO!

<http://www.watersavinghero.com/>

### **BAY AREA EDUCATORS: LOOKING FOR INFORMATION ON REBATES AND OTHER WATER CONSERVATION INCENTIVES?**

Three consecutive record-dry winters throughout California have resulted in the greatest threat to our water supplies in nearly 20 years, prompting the governor to declare a statewide drought. Learn how your local water provider can help you reduce consumption and help you become a Water Saving Hero!

### **COMMUNITY FOR A CLEAN WATERSHED PROGRAM**

<http://www.cleanwatershed.org>

The Community for a Clean Watershed program was established to protect Ventura County's watershed by preventing stormwater pollution- but this website is loaded with great information for anyone living in the state-. Click on the '*Watershed Pollution Prevention*' link to see a list of tips to protect the watershed at work or around the home that can be rolled right into '*Sum of the Parts*' (p: 267) as examples of *Best Management Practices*!

### **RAINWATER HARVESTING in San Francisco**

<http://sfwater.org/Files/News/FAQ092909.pdf>

Brought to you by the San Francisco's Public Utilities Commission, this website provides answers to questions on installing rainwater barrel and cistern systems within the city- including information on rebates. You'll also find great information on system design, sizing and installation; system operation & maintenance; costs and loads of links on worldwide harvesting efforts. SFPUC also provides a power point overview (<http://sfwater.org/Files/News/FAQ092909.pdf>) and a brochure (<http://sfwater.org/Files/News/Broc092909.pdf>) that you may find useful.

### **RAINWATER VENDORS**

<http://www.harvesth2o.com/vendors.shtml#ca>

This website has an extensive list of businesses and organizations with information and expertise on rainwater harvesting systems throughout the state- including a several rebate programs.

### **WATER USE CALCULATOR**

<http://www.waterbudgets.com/ConserVision/CUWCC/DataInput.htm>

Compare the water budget to your actual water bill and see how much water you could be saving. Then try the Water Use Calculator again with more water efficient landscaping added and see the difference in savings \$\$ this can make.

### **USGS: WATER SCIENCE FOR SCHOOLS**

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

Our Special Topics section lets you explore other water-science topic areas, such as water quality, urbanization and water, saline water, watersheds, runoff, and hydrology. Rated one of the best websites by Government Computer News (CGN), the site raves that the 'USGS educational site on water... offers almost everything a student, or anyone else, would ever want to know about the wet stuff. And we mean everything!'

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

**Check our website [www.watereducation.org](http://www.watereducation.org) and/or contact us for updates.**