

US EPA ARCHIVE DOCUMENT

Innovative Energy Management Workshop  
Move Less Water & Save Money

# Harvesting Rain

Managing Water Resources  
Wisely

By: Trisha Macomber

The background of the slide is a solid blue color. In the lower right quadrant, there are several decorative, semi-transparent white ripples that resemble water droplets hitting a surface, creating concentric circles.



# What is Rainwater Catchment?

....and why is it important for our future?



Population growth  
Finite water resources  
Future water needs  
The cost of treatment



# Is Harvesting Rain Viable?



Kniffen's  
Home

8.5-10" rain/yr  
is the only  
source of water for  
this home owner



We know it's viable, but why use it if you have a centralized supply?

Reduction in operating costs

Money saved on energy and fuel

Efficiency

Even a small tank makes a big difference



# Chino Valley, AZ



550 Homes, averaging 2000 sf per home were built with a catchment tank

For every inch of rain collected from the roofs, 687,500 gallons of fresh water can be collected.

13 inches of rain annually = 8.9 million gallons of water per year



# Seattle's Rainwater Harvesting

Seattle  
Public  
Utilities

## Storm Water Management/Rain Water Harvesting

### A city in tune with nature



Water defines Seattle, from the Cascade snows that contribute to our water supply to the inland sea of Puget Sound – and the rivers, lakes and creeks in between.

But these once-natural systems have been irrevocably altered by urbanization, threatened by pollutants washing from our roofs and streets. Seattle Public Utilities has tackled these problems and we are encouraged by progress thus far. Mayor Greg Nickels' Restore Our Waters program is revitalizing our urban creeks, lakes and Puget Sound.



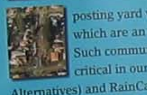
*"You've got to see it to believe it."*

Small caption: Part of the PUG before "restoration" of Seattle's Natural Drainage Systems, April 2, 2005.



### Doing the right thing

Seattle is fortunate to have an aware, involved citizenry where doing the right thing is woven deep in the mostly green social fabric – whether it's energy and water conservation, recycling, com-



posting yard waste or reviving the urban creeks which are an integral part of Seattle's hydrology. Such community involvement has been critical in our SEA Streets (Street Edge Alternatives) and RainCatcher pilot projects. In these neighborhoods, residents have embraced the new ideas of Natural Drainage Systems, a decentralized approach that mimics nature and lets natural materials like plants, soil and rock do the work.

### Natural Drainage Systems

These programs aim to curb the runoff from heavy rains that devastate creek habitat, flood streets and dump society's toxic wastes into the city's creeks, lakes and Puget Sound. The SEA Streets projects have shrunk and reduced stormwater runoff by 98 percent. The Natural Drainage Systems approach has become fundamental to Seattle Public Utilities' planning.



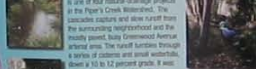
### Broadview Green Grid

The Broadview natural-drainage project is Seattle's first residential. It has transformed 15 city blocks from concrete, grass-strewn asphalt to landscaped, permeable-friendly street scenes that allow storm runoff before it reaches Puget's Creek.

Swales – small wetlands, plants and spaces – with the trees hand in hand, slowly percolate runoff back into the water table. Permeable, porous pavements and other trees that otherwise would had paved over the swales.

A natural gravel water helps sustain the creek and by doing so, through the dry summer. Streets in the project have 25 percent less pavement than conventional streets and they're designed to slow traffic. The addition of hundreds of trees and thousands of plants brings the neighborhood back in line with nature, increasing its value and attractiveness to families.

Residents were launched in 2003 and dedicated May 9, 2005. Its \$2 million price tag is comparable to conventional infrastructure requirements but, unlike conventional systems, its value increases over time.



### Neighbors building neighborhoods

Neighbors building neighborhoods is a series of community events that help residents build a sense of ownership and pride in their neighborhoods. The program is a series of community events that help residents build a sense of ownership and pride in their neighborhoods. The program is a series of community events that help residents build a sense of ownership and pride in their neighborhoods.



### Raincatching By the barrel... and more

From its Cascade Mountain watersheds Seattle imports an average 60 million gallons of potable water a day, yet most of it goes to landscaping, building construction and parking lots. On the other hand, it rains 140 million gallons a day in Seattle, averaged out, much of that on rooftops.

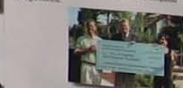
Rain harvesting makes sense here as much as anywhere, especially on stormy days when sewers can overflow in the deluge.



### On the horizon

Two other Natural Drainage System projects are underway. High Point is a 120-acre, mixed-income housing development in West Seattle's Langley Creek Watershed. The 1,000-unit, 24-acre development, conceived in partnership with Seattle Housing Authority, is being built around an integrated Natural Drainage System.

The Fremont Green Grid, in northeast Seattle, will use the same Natural Drainage System techniques in an area of 140 homes to improve the water quality of Foster Creek. General will be broken into several and the \$4.8 million project will be completed in eight months.



Seattle's SEA Streets and other natural-drainage projects are making an impact. A 2002 Water Award from the Puget Sound Regional Council in 2003. An Innovation in Good Government Award – along with \$100,000 – from Harvard University's Kennedy School of Government in 2004. A first award from the Washington chapter of the American Institute of Architects for the High Point project. An accolade of "innovative" from the national radio program, "Talk a Day". And from the neighbors: "There's been a lot of community, with children riding bikes and families walking," says resident Christine Roberts.

**Barrels**  
Seattle Public Utilities has sold almost 7,000 rain barrels (averaged, of course) in two years as part of the National First Care program, which promotes smart watering, composting, mulching and pesticide reduction. Natural First Care is a partnership with King County and the Puget Sound area water providers.



**Seattle RainCatcher**  
The Fremont/Green Grid is on Seattle's priority list for combined sewer overflow, and a good chance to install decentralized gutters and downspouts from the sewer system.

Seattle is identifying homes to divert rooftop rainwater to cisterns and other water-saving features, such as compost, mulched soil and eye gardens. During winter, the RainCatcher system slows the flow of stormwater into side sewers and street drains. In spring and summer, water from the cisterns will help irrigate home-garden plants. After a series of community meetings, 60 homeowners volunteered for the project and 20 were selected. One cistern system already is up and running and installation of the others will begin this summer. Cisterns from 200 to 1,000 gallons and their fittings are being installed free.

The project cost is \$190,000. A \$1 million grant from the U.S. Environmental Protection Agency will enable Seattle to launch an umbrella RainCatcher program in southeast Seattle.

It's another off-site situation, good for the homeowner, the city and the environment.

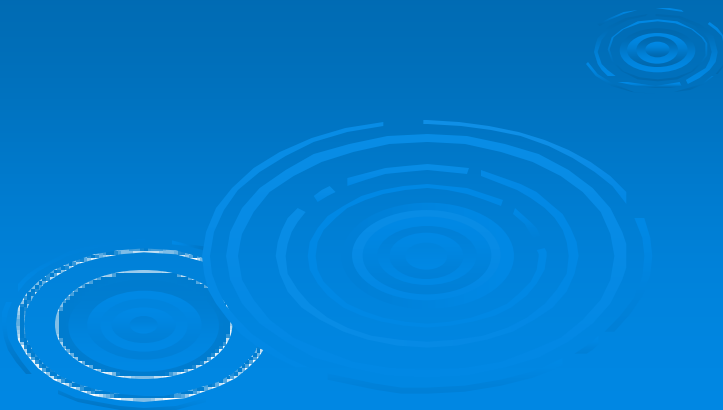
**Kudos**  
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# Seattle City Hall





# Green Roof



# Toilet Flushing







Swales, ground permeation techniques, catchment tanks and narrowed streets reduced surface runoff by 97%





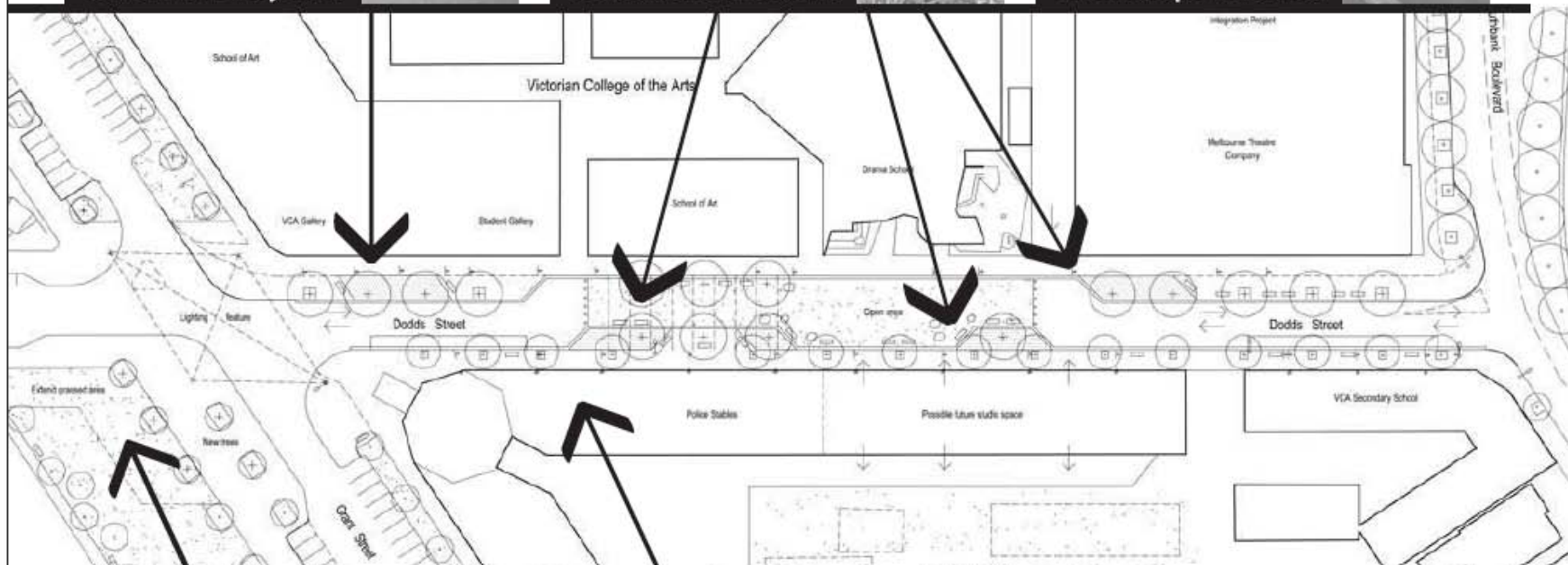
**Bioretention system**



**Constructed wetland**



**Streetscape renewal**



**Garden irrigation**



**Rainwater harvesting**

**Garden irrigation**

Public open space in Grant St can be watered by treated stormwater from Dodds St wetland.

**Rainwater harvesting**

Capturing roof runoff from Police stables and Dodds St buildings thereby minimising stormwater runoff and discharge. Roof runoff could be used for horses and washing down stables.



# Programs to Encourage Sustainable Building and Water Use

- LEED Leadership in Energy and Environmental Design – A rating system for designing, constructing and certifying the world's greenest buildings.



- Cascadia Green Building Council The Living Building – Focusing on beauty, inspiration, site, materials, water, indoor quality, energy.



# Living Building

## Sustainable Water Resource Management



Hale Kumau – Big Island Hawaii





Pleasant Harbor - Hood Canal

- 900 Residents
- Marina
- Golf Course



Will capture, reuse and  
recycle all water on site

# Pleasant Harbor Hood Canal A Living Building Design



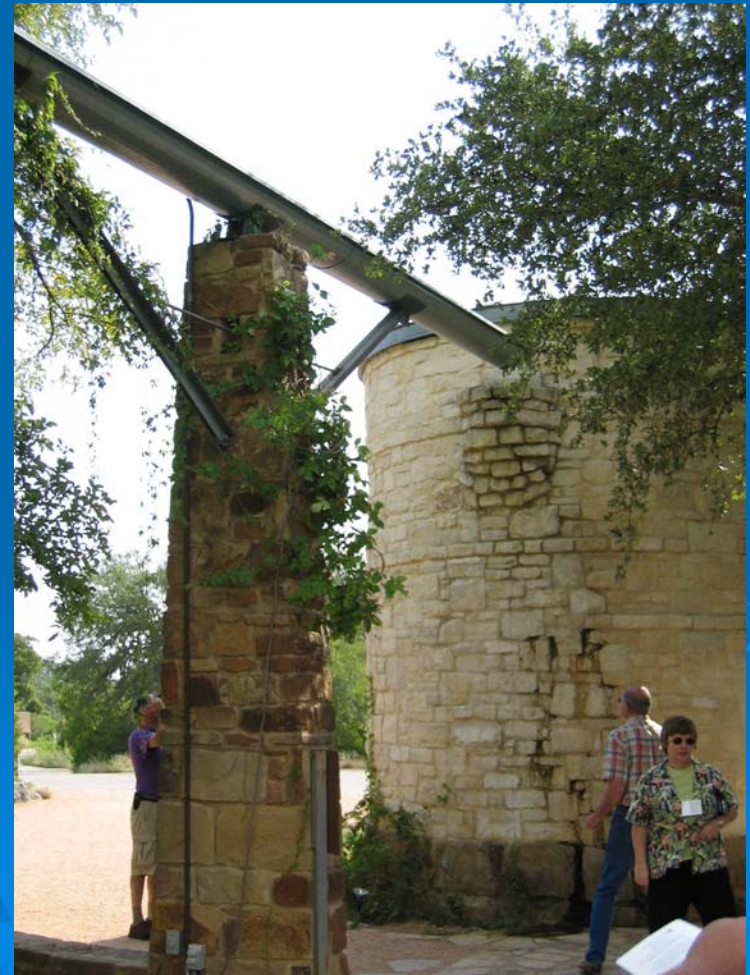
Pleasant Harbor – Proposed Re-Development





# Rainwater Catchment

Rainwater catchment is one method of reducing your costs and water demand. Whether you strive for complete water independence or simply want to augment your supply.




# In Order to Provide Sustainable Water Systems...

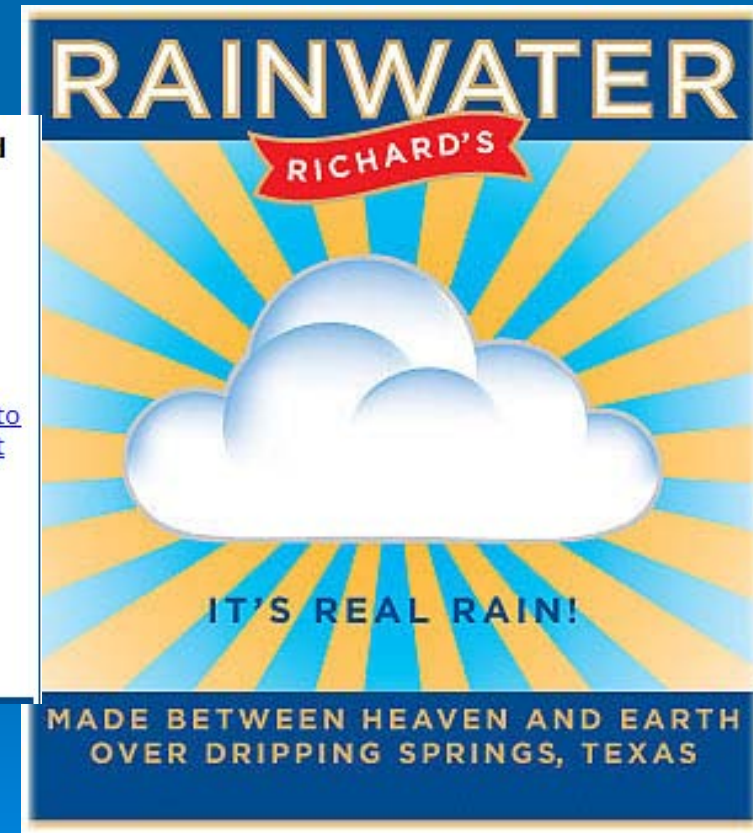
- There needs to be a reasonable balance between Human Health Risks, Environmental Issues and Economics
- There also needs to be reasonable regulations that allow for innovative design and ideas. This includes eliminating outdated rules that don't match today's needs and technologies
- There needs to be a reason for people to change, be it incentives, social conscience, building and/or legislation.



....but if you really need capital  
then bottle the rainwater and sell it.

Product	Description	Price	Add
	Fresh-squeezed Cloud Juice. Made between heaven and Earth over Dripping Springs, Texas. UPS Ground shipping included in cost.	\$35.00	<a href="#">Add to cart</a>

(12) 1-Liter Bottles





# Mahalo for Your Attention

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Links for more information on rainwater catchment:

UH Manoa Rainwater Program – [www.hawaiiirain.org](http://www.hawaiiirain.org)

American Rainwater Catchment Systems Association – [www.arcsa.org](http://www.arcsa.org)

International Rainwater Catchment Systems Association – [www.ircsa.org](http://www.ircsa.org)

HarvestH2O – [www.harvesth2o.com](http://www.harvesth2o.com)

.....and thanks to folks who contributed to the information in this presentation:

- Mark Beuhrer – 2020 Engineering
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