## Watershed Management Group

# A Watershed Moment

Summer 2011

## Think Global, Drink Local

- ♦ 5 Reasons Not to Hit the Bottle: Tap vs. Bottled Water
- Profile: Off the Grid
- Mini-workshop:Outfit Your Cistern for Potable Water
- WMG India Update





## Think Globally, Drink Locally

**◆ Lisa Shipek**, Executive Director

Eating local food is gaining popularity with a wide spectrum of people. People who intentionally seek out and eat local foods have been dubbed "locavores."

Local food is touted for its health benefits, small carbon footprint, and boost to the local economy. But most importantly, eating locally connects people more directly to their food to understand where their food comes from, how it is produced, and its impacts on the environment and livelihoods.

Amidst all the talk about urban farms, community supported agriculture, heritage fruits and vegetables, artisan bread, and farm to table restaurants, where is the talk about drinking locally? Have locavores failed to consider the liquid accompaniments to their local food?

To be fair, there is a movement afoot promoting drinking tap water over bottled water, and there is a growing interest in locally produced wines and beer.

But how often have you or the people you know stopped to think about our most basic resource, our drinking water, and what impacts the water we drink has on our community – both locally and globally?

Imagine a day when neighbors compare the taste of their filtered rainwater; when businesses offer



you a glass of water filtered from their cistern instead of imported bottled water; or when we can purchase artisan juice, wine, or tea made from local rain instead of from water transported from thousands of miles away.

Sound unlikely? Well this is already happening in places like Australia — where many people harvest and drink rainwater from their roofs — and many islands, like Bermuda, where there is no groundwater or surface water and harvested rainwater is the sole source of household water.

#### What does 'drink locally' mean?

If you drink tap water you are on the right track. Drinking locally means drinking water and other beverages that are produced locally or from local sources of water. There are many different tiers of "localness" for water and

(Drink Local, continued on pg. 2)

## Dear Readers,

As you quench your thirst on a hot summer day, you might take a moment to ponder the liquid you are drinking and where it comes from. In this newsletter, we provide insight on the impacts of our liquid choices and how we can make healthier and greener selections.

One of the most basic things we can do is drink tap water instead of bottled water—the Sierra Club makes the case on page 3.

If you have caught the cistern bug, perhaps we can help you transform your rainwater into drinking water.

Don't miss the latest update on repairing spring boxes for drinking water in India on page 8.

So, grab a big glass of water and enjoy the newsletter, because all this talk about liquids is going to make you thirsty!

Lisa Shipek

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beverage consumption. Use the Drink Local Ladder to the right to help guide your progressive steps to becoming a Liquid Locavore.

#### Why drink local?

Here are some concrete reasons why you should consider making the shift:

- Filtering your own tap water significantly reduces plastic waste.
- Filtering your own tap water or rainwater reduces the energy needed to transport and treat water. Water weighs 8.3 lbs/gallon (62.4 lbs/cubic foot), which makes it a very heavy product to transport. Is your bottled water, juice, or beer being shipped from across the country or perhaps even across oceans?
- Capturing rainwater on site reduces reliance on remote or non-renewable water sources. For example,
   Tucson water is a mix of surface water transported 300 miles via canal from the Colorado River and ancient groundwater pumped from very deep wells. It takes tremendous energy to pump and deliver this water, plus maintaining expensive infrastructure.
- You have control over your water quality. The water quality of bottled water is unregulated. Rainwater can often be better quality than municipal water; for example, Tucson's Colorado River drinking water has about 650 parts per million of dissolved solids, while rainwater has only about 200 ppm of such contaminants.
- By drinking locally produced beverages, you are supporting your local economy and small businesses while conserving energy.

#### In Conclusion...

Bottled water is expensive, unregulated, landfill-clogging, and fossil fuel-reliant to produce and transport.

Tap water is (nearly) free, regulated by government water quality standards, less reliant on fossil fuels and less polluting than bottled water.

Rainwater, meanwhile, falls free from the sky, is 100% non-polluting, relatively clean, with no reliance on fossil fuels for its production – and local!

So how much of a liquid locavore do you want to be? Check out some true liquid locavores on pg. 5 and our mini workshop on drinking rainwater on pg. 6. I invite you to join me on the frontier of this budding movement!



#### **Drink Local Ladder**

**Step 1:** Drink tap water — filter your tap water instead of buying bottled water.

**Step 2:** Drink locally produced beverages – drink juice, tea, soda, beer, and wine that is made in your city or region.

**Step 3:** Capture, filter, and drink rainwater that falls on your property.

**Step 4:** Drink locally produced beverages made with local rainwater.

For extra brownie points:

Use filters that conserve water. For example, select reverse osmosis filtering systems that recycle waste water or direct reverse osmosis wastewater to irrigate a garden plot.

## 5 Reasons Not to Hit the Bottle — Tap vs. Bottled Water

**◆ Natalie Melkonoff, Guest Writer** 

Natalie is an intern for the Sierra Club's Grand Canyon Chapter and is the former President of Xavier Environmental Response Organization.

There are a number of reasons why we should leave plastic bottles on the shelves and quench our thirst with water from the tap. It all comes down to health, sustainability, and cost effectiveness. Let's look at a few facts:

Municipal water systems provide us with clean drinking water. There are approximately 155,000 public water systems in the United States that provide drinking water to 90% of all Americans. The tap water these systems provide is safe to drink, highly regulated, and affordable. Why spend more on water that isn't better quality? About one third of bottled water, including big name brands such as Aquafina and Dasani, comes from municipal sources, the same sources that feed your tap. If you are unsatisfied with the taste of your city tap water, invest in a water filter instead of turning to bottled water. Filters can be installed on individual faucets or under sinks

and range in price from fifteen to two hundred dollars.

Bottled water is drastically more expensive than tap water. The EPA estimates that the average cost of tap water in the US is \$3.48 for 1,000 gallons. That means one penny buys about 2.9 gallons of water. As shown by the Food and Water Watch survey of 2007, bottled water ranges in price from \$0.89 to \$8.26 per gallon. Ounce for ounce, bottled water often costs more than gasoline.

With the ongoing recession, we often hear complaints about economic hardships when gasoline approaches \$4.00 per gallon, but many people do not think twice about paying the same or higher prices for bottled water.



Producing and transporting plastic bottles has a negative environmental impact. Did you know that on average it takes one quarter of a bottle's volume in oil to produce, transport, and dispose of each plastic water bottle? That would be three ounces of oil for each twelve ounce plastic water bottle. The Pacific Institute estimated that it took more than 17

million barrels of oil and generated more than 2.5 million tons of carbon dioxide to produce bottled water for U.S. consumption in 2006. Transporting these bottles across the country requires more energy and adds more carbon dioxide to the atmosphere, not to mention the additional pollution resulting from shipping plastic water bottles around the globe.

Plastic bottles fill landfills and are carelessly discarded as litter. Billions of plastic bot-

tles are thrown away every year. More than eighty percent of our plastic bottles are not recycled and are either taking up space in our already bulging landfills or floating around in our environment. Plas-

(Bottle vs. Tap, continued on page 4)

#### Cost per Gallon

Tap water: negligibleHomemade coffee: \$0.70

Gasoline: \$3.30Milk: \$3.79

Carlo Rossi wine: \$5.65Evian bottled water: \$6.40

Jamba Juice: \$21.82

Source: www.cockeyed.com, www.gasbuddy.com

## \$25,000 Challenge Match—Your Chance to Give

This summer, you have the opportunity to make a financial gift to WMG that will be matched dollar for dollar. One of our loyal supporters has offered a \$25,000 challenge match to inspire WMG donors to give generously and help us raise \$50,000 by the end of August.

Please make a donation today, if WMG has impacted your life or community, and you are eager to ensure WMG's programs continue and expand.

## Many exciting developments lie ahead that will be made possible by your donations, including:

- Expanding the Green Living Co-op program to offer new workshops in passive solar energy collection and backyard gardening and training new Co-op Instructors in Phoenix and Santa Barbara.
- Developing a Spanish Water Harvesting Certifica-

tion program

- Reaching regional audiences with our Green Streets trainings, design standards, and community workshops and expanding our work with Tucson neighborhoods.
- Helping rural communities gain access to safe drinking water and launching a comprehensive school hand washing program in our India branch.
- Transforming the Conserve to Enhance program from a pilot initiative to a public program open to all Tucson Water customers to designate water savings to benefit local rivers.

At the end of the day, Watershed Management Group is here to serve the public good. **When you join WMG** as a donor, you too serve the public good. And this is a gift that will benefit us all.

(Bottle vs., Tap, continued from pg. 3)

tic bottles that are carelessly discarded can end up on the side of the road or in the ocean. In both cases, the bottles endanger local plant and animal life.

Water isn't a commodity, it's a right. Clean drinking water is a public resource, not a good to be marketed. It is important to remember that companies who produce bottled water are in the business to make a profit. Buying bottled water undermines support for our public water systems and for needed investments in public infrastructure to provide clean, safe and affordable water for all. Every bottle you purchase endorses the further privatization of water resources that should be held as common property for the benefit of everyone.

So what can you do about it?

Here are five easy steps to getting you on your way to a water experience that is cheaper, healthier, and more sustainable.

- 1. Say no to bottled water! Remember that every time you purchase a bottle of water you are endorsing the "water for profit" industry. Every time you use tap water you are supporting your municipal water system and helping to ensure that everyone in your community has access to clean, safe drinking water at an affordable cost. Don't use bottled water unless it is absolutely necessary.
- 2. Carry a refillable water bottle with you. If you have your own bottle you can fill it on the go from any number of public or purified water sources. Carrying your own water bottle will be a good reminder for you as well as one for everyone who sees you sporting

the eco-friendly solution.

- 3. Drink tap water at home. Keep a pitcher of filtered water or a supply of recyclable glass bottles filled with tap water in your refrigerator. Install a filter on your kitchen faucet or use an under sink filtration system if you want to improve the taste of your tap water.
- 4. Encourage your city and state officials to stop selling or using bottled water except in emergencies.
- 5. Talk to your friends! You can do a lot by spreading the word. If you change someone's mind, chances are he or she will change someone else's. Share "The Story of Bottled Water" at <a href="http://www.">http://www.</a>

stopcorporateabuse.org/story-of-bottled-water?r=TOTB. ▲

## OFF GRID

# How One Couple Turns 1,200 ft<sup>2</sup> of Roof Into a Year's Water Supply

**◆ Lindsay Ignatowski** Outreach & Program Coordinator

How much roof space do you need to capture enough rainwater to fulfill all your drinking, bathing, and laundry water demands?

For homeowners Larry and Marti Selman, only about 1,200 ft<sup>2</sup>.

The Selmans collect water from the roofs of their two-bedroom house and one-bedroom pump house and direct it into a series of seven cisterns that hold a combined total of 14,000 gallons of water. By filling these seven cisterns during the rainy monsoon period and using the water throughout the rest of the year, the Selmans are able to meet all of their water needs without purchasing any municipal water.

In fact, the Selmans have lived completely off the



Larry and Marti Selman enjoy their harvested drinking water at their home outside of Bisbee, AZ.

grid since they purchased their home just outside of Bisbee, AZ, three years ago. In addition to harvesting their own rainwater, Marti and Larry also capture their own energy through solar panels.

The couple relishes the independence their off-thegrid lifestyle affords them. "We feel good," said

Larry. "No one can turn our water off or turn our electricity off. It feels good to have control of these things."

Though the Selmans always have enough water to meet their needs, Larry said that harvesting their own water supply has made them more conscious of the water they use – they limit their shower times to four or five minutes, and have chosen lowwater-use appliances.

"It's wonderful water — it's so soft."

- Larry Selman

In order to ensure that their supply is clean, they disconnect their collection system for the first few rains each season to clean any debris off their metal roof. The water is routed from their cisterns to their pump house where it is pressurized and pumped into their home. Each water outlet has two filters, a particle filter and a carbon filter – though Larry says these are more precautionary than necessary.

The Selmans are very pleased with the quality of the rainwater they harvest. "It's wonderful water. You notice the difference in the shower – it's so soft," said Larry. He says he hasn't noticed any difference in taste between his harvested rainwater and municipal water.

For those considering harvesting their own potable rainwater, Larry says, "It has to be part of your lifestyle. We both are nature lovers. We just like the idea of collecting rainwater. [And] you don't need a whole lot of roof to collect a whole lot of water!"

## Mini Workshop: Outfit Your Cistern for Potable Water



#### • Mark Ragel, Guest Writer

Mark Ragel is owner of Water Harvesting International—which specializes in belowground and ferrocement tanks in Arizona

and West Africa.

Rainwater.....Is it safe to drink?

YES, but first let's review precautions that will ensure 100% safe, pure water for you and your potable needs. Humans have been harvesting rainwater for thousands of years. In many parts of the world, including for up to 50,000 residents of Hawaii, rainwater is the sole water supply.

Rainwater falling from the sky is clean and safe to drink. It hits the earth almost pure; however, water is a universal solvent and has the ability to absorb anything it contacts.

The best way to ensure safe, drinkable water is to design and maintain the four areas of the rainwater system starting from where the rain falls to your water glass. The four areas to consider are:

- Catchment area
- Pre-filtration and conveyance system
- A safe, solid storage area
- Filtration and purification system

Following industry approved methods, rainwater can safely meet and exceed EPA standards.

#### **Catchment Area**

The most important step to ensure that your rainwater is clean is to make sure you have the right roof type. A steel roof or a flat roof must be NSF Protocol 151-approved. Clay and concrete tile roofs are also good options. Galvanized steel and asphalt shingles should not be used for drinking water. Inspect your roof surface periodically to ensure its protective coating is intact. Approved flat roof coatings have a 5 to 7 year life expectancy before recoating is required due to ultraviolet degradation.

#### **Pre-Filtration and Conveyance Piping**

The best way to have clean water for storage - and



ultimately drinking
- is to reduce and/
or eliminate every
opportunity for
contaminants to
enter your water
system. A properly designed
rainhead (also
known as leaf
catcher) with a
mosquito-resistant
screen should be
installed to pre-

vent insects, leaves, and larger debris from entering the cistern. Install a first flush device to capture and filter out one gallon of water for every 100 ft<sup>2</sup> of roof surface area. The first flush or roof washer will greatly reduce fine sediment and bird droppings from entering your system. Ensure all gutters and conveyance piping are approved for potable water. PVC piping is approved, but black ABS piping is not drinking water approved. Inspect your gutter and conveyance system periodically to ensure stagnant water is not being flushed into your system and all screens are intact and functioning properly.

#### Storage Tank

For potable water, your storage tank must be lined with an approved NSF coating or be manufactured with an approved sealant. Water collected and held in containers that haven't been approved for water storage can be deadly. Plastic garbage containers, for example, can contain toxic dyes and biocides that could leach into the water. All tanks must be opaque to prevent algae growth. Your inlets gutters, first flush, conveyance, overflow, and air vents must be screened to prevent mosquito and other vermin infestation. Most opaque Polyethylene tanks are sunlight resistant. Steel culvert cisterns must be coated with an NSF coating to prevent the zinc from the galvanized coating from contaminating the water. Concrete cisterns coated with Thoroseal or Aqua-fin 2Km are approved for drinking water. Your tank should be secured with a

(Cisterns, continued on page 7)

(Cisterns, continued from page 6)

lid that requires tools to remove preventing pets and children from getting into the tank.

## Filtration and Purification of a Potable Water System

Sanitation is the most important, sometimes complicated, and always controversial topic related to rainwater. As we read about people becoming sick and dying from Cholera in Haiti and e-coli in Europe, waterborne illness is a serious concern. However, water is relatively easy to sanitize.

Rainwater is essentially "distilled" in the atmosphere, but on its way down to earth it can become a medium for harmful pathogens. Drinking water contaminated with human or animal waste is a serious problem.

Our harvested rainwater should be treated to the same standards as all public water systems. Contaminants can be removed by good filtration or absorption, or inactivated by exposing them to a disinfectant. Starting at the roof, the water is screened, and then particulates settle out in the cistern, forming a sediment layer. The water is filtered with a 2 or 3 stage filtration process starting with a 20 micron filter followed by a 3 to 5 micron filter, than possibly 1 micron filter. All the filtration equipment must meet ANSI/NSF standard 53. After filtration, the water is "clean" enough to pass through an Ultraviolet system that meets ANSI/NSF standard 55. The best systems have monitoring probes that ensure the UV chamber is working and in the event of a bulb failure, the system shuts off the water to the home

to prevent contamination. Water taste can be improved by installing a charcoal filter prior to the UV system.

Finally, if you are connecting a pressurized rainwater source into a domestic water system, many municipalities mandate a code compliant backflow prevention device if you have the system piped to switch between "city" water and rain water. In rural areas, where rainwater is the only water source, this does not apply.

#### **Other Water Filtration Options**

Other options are to install a quality reverse osmosis system on just the drinking and cooking water tap. The unit must be installed downstream from the above discussed filtration and purification "train".

I have visited rural areas where the rainwater is just filtered for the showers and laundry use. All the drinking water is processed through a simple countertop filtration and purification system. Other people even use a simple "backpackers" filter for their drinking water.

Hopefully I have peaked your interest in the possibilities for capturing and filtering your rainwater to drink. For more information, please check out these resources:

Texas Rainwater Harvesting Manual

www.twdb.state.tx.us/publications/reports/
rainwaterharvestingmanual\_3rdedition.pdf

Counter top drinking water filters

doultonusa.com & 911water.com

Emergency water filtration system

http://www.sawyerpointonefilters.com/

#### Maintenance Checklist

#### **Annually**

- Test water quality for bacteria, cryptosporidium, giardia, fecal coliform and total coliform. Review and maintain baseline records.
- Change carbon elements in filters and UV lamps.

#### Twice a year

- Inspect piping for leaks. PVC must be painted to prevent UV degradation. Make sure pipe hangers are secure. Inspect overflow piping and animal screening or one-way check valves. Ensure the vent screen is clear.
- Inspect cistern and supporting foundation. Look for signs of settlement and erosion. When the buildup is 1" to 2" deep and the tank is empty, remove sediment.
- Inspect sediment filters and change if excessively dirty.

#### Quarterly

- Prefiltration: Inspect debris and mosquito screens. Empty your first flush after each of the first 2-3 rain events of each season.
- Inspect the pump and pressure tank for leaks and unusual noise.
   Ensure the pressure tank is at the preset initial pressure. If the pump is cycling excessively, adjust the pressure tank to manufacturer's specifications.

#### After a large storm/high winds

- Inspect gutters, looking for blockage at the downspout and collection areas. Keep trees and overhanging branches trimmed. Annually flush gutters of sediment and repair sections that hold standing water.
- Check pre-filtration devices.

## WMG India Provides Simple Water Safety Testing

#### **◀ Jared Buono**, WMG India

The monsoons have started in India.

A few weeks early for this area, the rain arrived with force and seems to have vanguished the sun entirely. The clouds have not broken in nearly six weeks and mold has taken over pretty much everything - we can't remember what a dry towel feels like. All things green have shifted into high gear

and people are busy preparing for cultivation: plowing fields, weeding, sowing.

Spring box installation.

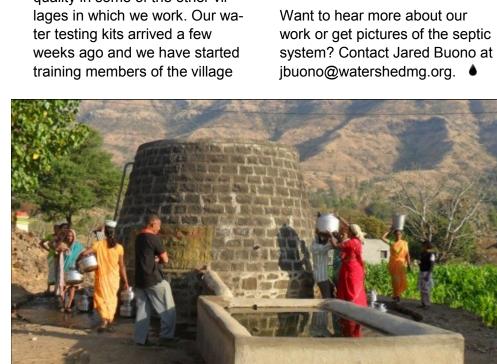
Over the last year we have been working with a small community named Pachputewadi, population approximately 400. They get their water from a series of small natural springs piped over a mile from the hills above the village down to the village center (pictured). But it is not enough water — only about 10 gallons of water per house per day. We have been helping the community design and plan for improvements to the water supply system and at the end of May we finally began construction, with 80 men and women from Pachputewadi climbing a mountain to volunteer for a day of community labor. We were able to complete most of the work plans, including two new spring boxes (see photo), providing almost 1500 gallons more per day. Unfortunately, the early onset of the rain means we will

> have to complete the work, including infiltration basins to recharge the springs, in September when the monsoons recede.

Since monsoon season often sees an increase in waterborne diseases. we have begun monitoring water

quality in some of the other vil-

councils to use them. The kits test only for fecal coliform (found in human and animal feces) and are very simple to use. Positive samples turn black and are visually very dramatic. We've had a few drinking water sources show signs of contamination and so we're working with the local councils to get further testing, determine pathways of contamination, and come up with ways to treat the water as well as protect the water sources. From village officials to ladies who carry water home to young school kids out on break, the contaminated bottles garner a lot of attention at the pumps and make news throughout the communities.



Visitors in Pachputewadi gather their ten gallon daily water supply.

## Green Job Training in New Languages and Topics!

### Water Harvesting Certification

This fall, WMG's 10-day Certification program will become the most comprehensive water harvesting course in the nation offered in Spanish. Expert translators, interpreters, and staff are working hard to translate our intensive ten-day curriculum to be taught completely in Spanish. Scholarships are available to Arizona/Sonora border residents. Apply by September 1, 2011 at www.watershedmg.org/tech-trainings.

In addition to the Spanish course, WMG is running our first California certification course in Santa Barbara this August! This program complements the launching of WMG's Santa Barbara Green Living Coop.

### Watershed Technical Trainings

The Watershed Technical Trainings (WTT) program, which offers advanced trainings in a variety of applied watershed management topics, will continue this fall with two new trainings in Stream Restoration and Eco-Sanitation. Each of these trainings will emphasize experiential

learning through hands-on assess-

ment, design, and implementation workshops. These courses are taught by leading experts in their field, many of who implement these practices through their own business.

## Upcoming Trainings

#### **Certification Courses:**

- 1. Tucson Spanish, November 4-13, 2011
- 2. Tucson or Phoenix, February 24-March 4, 2012
  - 3. Tucson (English), May 4-13, 2012

## Advanced Technical Trainings:

- 1. Stream Restoration, October 6-8, 2011
- 2. Eco-sanitation, December 10-11, 2011
- 3. Advanced Cisterns, January 25-27, 2012
- 4. Advanced Greywater, February 15-17, 2012
- 5. Green Infrastructure, March 29-31, 2012



Above: Students build a ferrocement cistern in the WTT Cisterns course. Below: An instructor show students a site map.

Through the Stream Restoration course, participants will gain a basic understanding of how desert streams and arroyos function, how they change over time, and the human influence on them, both positive and negative. Emphasis will be placed on urban wash restoration practices, such as the creation of check dams and other earthworks, from backyard to larger drainage scales.

Eco-Sanitation is a growing field that offers alternatives to traditional wastewater treatment, such as composting toilets and Watson's Wicks. The Eco-Sanitation WTT will cover simple to more complex eco-sanitation methods, covering the design, construction, maintenance, and use of finished products. Composting toilets can prevent contamination of waterways, reduce potable water usage, and turn waste products into resources to increase soil nutrients.

Visit www.watershedmg.org/tech-trainings for more information or contact Tory Syracuse at 520-396-3266.

## Thanks to Our Many Individual Donors

#### **Donation Levels**

• Dewdrop: \$25

• Silver Raindrop: \$50

• Flowing River: \$100

River Basin: \$500

International Watershed: \$1,000

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#### **Special Thanks**

- Thanks to Susan Banes, Carl Case, Henry and Ruth Jacobson, and Gail Ryser for hosting our first bike progressive dinner by cooking delicious courses for each stop!
- Thanks to Ericka Cero Wood of Cero Wood Graphic Design for designing the flyers and postcards for our Tucson and Phoenix Open Houses.

Watershed Moment is a quarterly newsletter written by WMG staff and guest contributors, with graphic layout by Lindsay Ignatowski and final editing by Lisa Shipek. If you are interested in submitting to The Watershed Moment, please contact Lisa Shipek at lisa@watershedmg.org or at 520-396-3266.

The mission of Watershed Management Group is to develop community-based solutions to ensure the long-term prosperity of people and health of the environment. We provide people with the knowledge, skills, and resources for sustainable livelihoods.