

WATER CONSERVATION



- Water Conservation Tips
- Rainwater Harvesting
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- Xeriscape Principles
- Lawn Removal

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City of Scottsdale - Water Conservation General Tips

Xeriscape is good planning and design, planting turf where it will be used, use of efficient irrigation, proper use of mulches, incorporation of drought tolerant plants in the design, and appropriate maintenance of the irrigation system and the plants in your yard. Desert adapted plants do best with deep, yet infrequent, watering. Over-watering will cause a plant to grow out of its natural form and can even kill your plants.

Minimizing grass areas in your yard because less grass means less water demand and less yard maintenance. Consider whether it would make sense to remove grass from non-functional areas. Replace the grass with low-water-use plants.

Put a layer of mulch around trees and plants. Bark chips, straw, gravel and even leaf droppings from your trees will slow down evaporation.

Don't water the lawn on windy days. There's too much evaporation.

When in a restaurant, turn your empty glass upside down if you don't want water. Not only will you save the water you don't drink, but you will also save the water used to wash the glass.

Check water requirements of various models and brands when considering purchasing any new appliance. Some use less water than others.

When washing dishes by hand, use the least amount of detergent possible. This minimizes the amount of water you need to rinse.

Check out Scottsdale's Water Conservation Department for Rebates:

Plumbing Rebates:

- Toilets, shower heads and free aerators
- Hot Water Recirculation Systems

Landscape Rebates:

- Landscape Irrigation Controller
- Turf Removal for Residential Customers
- Turf Removal for Commercial and Residential Common Areas

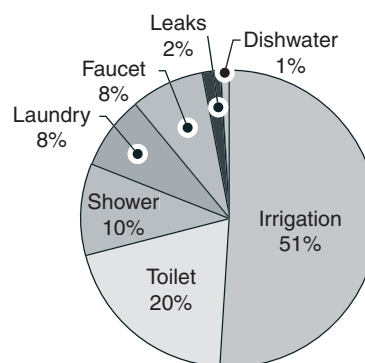
According to the Atlanta Journal Constitution, within the next 30 years Lake Lanier, fed by the Chattahoochee River, may not be able to supply enough water to the growing Atlanta area if current use patterns continue. By the year 2050, the worldwide availability of freshwater will have decreased by a third as a result of global warming, population growth, and wasteful habits. The natural underground aquifers will be at all-time low levels. Scarcity of fresh water will become the limiting factor for healthy, livable communities. Using water conservation techniques, like rainwater harvesting systems, helps reduce the negative impacts on our water supply, keeping our cities vibrant and healthy.

The average U.S. household uses 146,000 gallons of water per year with up to 50% of water going towards landscaping during summer months. Installing a rainwater harvesting system is one way to reduce outdoor water use by collecting water during the rainy season that can be used during droughts. By capturing water on a 1500 square foot roof, a family could reduce their water bill by 50 percent and save 43,000 gallons of water yearly.

Why harvest rainwater?

- Save money! Avoid the increasing economic and environmental costs associated with purchasing water from the centralized water system. Operating costs are lower than the cost of purchasing water from the centralized water system.
- Save energy! By reducing water use, energy demands to pump water from the water treatment plant to the service area are reduced. The number of newly built polluting power plants will also decrease as a result of collecting rainwater.
- Save water! Reduce the demands on scarce surface and ground water sources. Reuse water instead of pulling from the water table (or a freshwater source). Centralized water systems and wells pull from the water table.
- Reduce erosion and stormwater run-off and increase water quality! Capturing the rain that falls on roofs reduces flash floods and household stormwater run-off. Less stormwater run-off may reduce the stormwater collection fee for the household and will certainly improve the health, quality, biodiversity of our watersheds, and replenish the water table (or our freshwater supply).

Typical Household Water Usage



Rainwater Harvesting Strategy

Rainwater harvesting systems for landscaping can be constructed quite easily and without the need of chemical filtration. There are five components to a rainwater harvesting system for landscape use. The water is collected on the *roof* and transported by gutters and *downspouts* through a *leaf screen* or a large particle filter to a *cistern*, where the water is stored. The water then flows through a simple gravity run *delivery system* to the garden.

Costs

A rainwater harvesting system has higher initial costs than buying water from the central water supplier, but the payback period is less than 1 to 2 years. Save up to 50% on the water bill by reusing water. The largest cost of the system is the cistern container. Construction costs (with new barrels) can range from \$250 to \$2000. This cost can be reduced drastically by purchasing barrels previously used for food products.

Maintenance

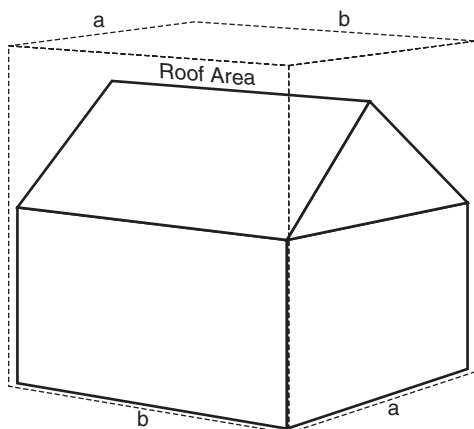
An effective system requires minimal, but regular maintenance. Change the filters every month or two depending on use. Clean the inside of the cistern yearly. Minimize the amount of debris in the gutters and keep leaves out of the filters.

Simple Rainwater Harvesting System in Five Easy Steps

Step One: Sizing your system.

The size of a rainwater collection system depends on the size of the roof, the amount of rainfall, and the water demands from the system.

1. Assess the landscape. How often and for how long do you water your lawn and garden a week? What do you use to water the landscape?
2. Calculate the water demand during the driest four months of the year (June-September). Keep in mind the following:
 - A sprinkler uses 480 gallons/hour
 - A regular hose uses 480 to 720 gallons/hour (Average is 600 gallons/hour)
 - A drip hose uses 1 gallon/hour for every 100 feet of hosing
3. Determine the average rainfall for your area (obtain this number from a local TV station or visit www.weather.com). This number will be needed to determine how much water will be caught.
4. Determine the size of the catchment area. Any roof of sufficient size with a gutter system can act as the catchment area as long as the water is used for non-potable uses. The above figure illustrates how to determine the area of the roof and calculate how much rain the roof will catch. The area is the length of the roof's gutter system multiplied by its width.



The catchment area of the roof is a simple calculation of width x length of the house. To find how much rain will be collected, take the area of the roof, multiply by the annual rainfall amount, then multiply by .5618 to arrive at the average number of gallons yearly.

Example: A house in Atlanta with a 1500 square foot roof. The lawn is watered with 4 sprinklers, three hours a week. The plants are watered with one sprinkler, two hours a week and with a hose for an hour a week.

- It rains 51 inches in Atlanta therefore the roof will catch 42,978 gallons. (Number of gallons caught derived from the following formula: square feet X .5618 X inches of rainfall.)
- Sprinklers: 4 sprinklers for 3 hours—12 hours X 480 gallons/hour = **5,760** gallons
- 1 sprinkler for 2 hours—2 hours X 480 gallons/hour = **960** gallons
- Hoses: 1 hour X 480 gallons/hour = **480** gallons
- **5760 + 960 + 480 = 7200** gallons/week X 16 weeks = **115,200** gallons of water demanded during the dry season.
- If this house utilized 500 feet of drip hoses for 14 hours a week instead of sprinklers only 1120 gallons of water would be needed.

Step Two: Choose the right cistern.

The size of the cistern depends on the amount of water to be collected and cost restraints. Choose a cistern that fits the needs of the water harvesting system. Collecting a small volume of water is better than collecting none. All cisterns should be watertight, durable, and have a clean, smooth interior. The cover

| Cistern Type | Advantages | Disadvantages |
|---|--|---|
| fiberglass tanks | prevents algae growth and evaporation, rust resistant, durable | higher initial costs, degradable, requires exterior coating |
| polyethylene tanks | various sizes, shapes, alterable, inexpensive, movable | can deteriorate over time if not treated for UV radiation |
| plastic garbage can | available, inexpensive | use only new cans |
| barrels | attractive, alterable, great for small systems | hard to find, small |
| 55 gallon steel drums | available, durable, great for small systems, moveable | prone to corrosion, rust and/or toxins |
| galvanized tanks | inexpensive, attractive, moveable, alterable | can rust, higher long term costs |
| plaster cisterns | low profile, inexpensive, can alter color | large footprint, unalterable, immovable |
| concrete tank-ferrocement, stone, or concrete block | durable, permanent | potential to crack, difficult to maintain |

needs to be tight fitting to prevent evaporation. A cistern with a lid allows for easy access to attach a faucet and to occasionally clean inside. It is best to place the cistern out of direct sunlight to prevent algae and bacteria growth, which can clog the system. The use of two or more smaller cisterns enables service on one unit at a time without disrupting the entire system.

Step Three:

Placement of the cistern.

- Place the cistern at a high point on the lot and elevate approximately 3 to 4 feet on a sturdy, load-bearing foundation or structure. This will create enough pressure to use gravity for running the water through a hose, soaker hose, or drip irrigation system to the landscape. Foundations can be made of bricks, concrete, or a wood frame. A full 55-gallon cistern will weigh around 500 pounds.
- Above ground cisterns are less expensive than a below ground cistern and easier to maintain. With this system it is easy to take advantage of gravity to guide water throughout the irrigation system.
- Below ground cisterns are good for colder climates. Storing water below ground can have aesthetic appeal while keeping the water out of the sun. Underground systems require a more complicated design and a pump to achieve gravity irrigation. Below ground systems tend to be used primarily in commercial sites due to the additional cost of pumping.

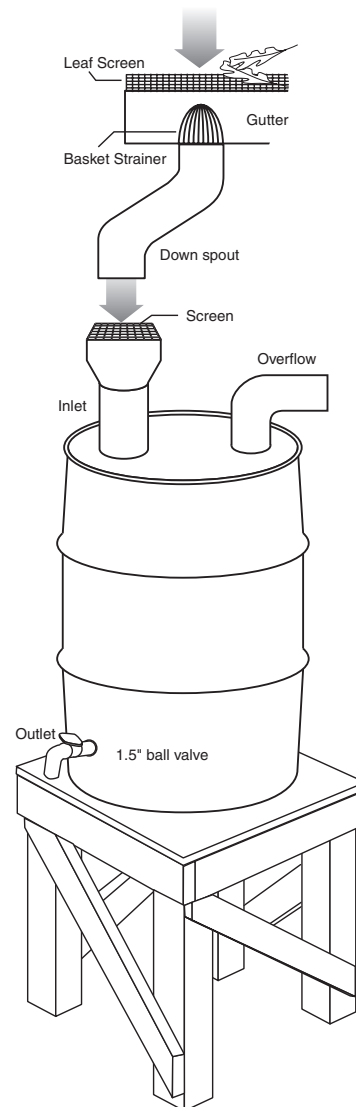
Step Four:

Set up a conveyance system with a large particle filter between gutters and cistern.

- Install continuous leaf screens, made of ¼-inch wire mesh in a metal frame, above the gutters to prevent debris from entering the system.
- Place a basket strainer (e.g. a screen or wire basket) at the top of the downspouts (optional). Make the downspout out of 4-inch diameter Schedule 40 PVC pipe or comparable piping. Angle bends should not exceed 45 degrees. Slope the piping at ¼-inch slope per foot minimum.
- Adapt the gutter to PVC piping with a downspout adapter.
- Place pantyhose or other filtering system before the head of the cistern to filter out debris from the roof.

Rainwater Catchment

Sample diagram



Step Five:

Set up a distribution system to remove water from the cistern to the landscape.

Place a faucet near the bottom of the cistern with a hose connection. Do not place at the very bottom because sediment will build up here. Drill a hole into the cistern for the connection and install a ball valve. Seal the area completely around the hole with aqua or water resistant sealant. (Sealant can be purchased at a hardware or pond supply store). Enough pressure is generated to run soaker hoses and drip irrigation systems from a cistern that is elevated 4 feet. A pump may be needed to create enough pressure to run sprinklers, which require a higher amount of pressure.

Troubleshooting Rainwater Harvesting Systems

Algae growth in the cistern.

- Water with algae growth is still usable for landscape watering. To reduce algae growth, which could clog up the system or slow down water flow, clean the system on a regular basis. Placing the cistern in the shade or underground or using dark barrels will help discourage algae growth.

Leaves on the roof or in gutters.

- Obstructions and leaves caught in the gutters can reduce the amount of rain captured. Clean gutters on a regular basis for maximum collection.

Finding a cistern.

- A variety of containers can be found at farm supply stores, local hardware stores, or on the Internet. Contact Southface Energy Institute for suggestions on where to purchase used drums.

Generating enough pressure to run a sprinkler.

- Water gains 1 psi of pressure for every 2.31 feet the cistern is elevated. A sprinkler requires at least 20 psi. An auxiliary pump may need to be installed to generate enough pressure. Solar powered pumps work well. Or use a drip irrigation system, which uses less power and water.

Xeriscaping—Water Efficient Landscaping

By using xeriscape and permaculture landscaping techniques, outdoor water use can be reduced by 50 percent without compromising the aesthetic qualities of the landscape.

Xeriscaping incorporates seven steps for developing and maintaining a water-wise landscape.

Step 1: Planning and Design

Divide the landscape into water-use zones. Incorporate shade and native/drought tolerant plants into the design.

Step 2: Soil Analysis

Determine what improvements need to be made to the existing soil. Soil testing can be done by your local extension service.

Step 3: Appropriate Plant Selection

Choose non-invasion, native plants that are appropriate for the soil and sun exposure. These plants will be drought tolerant and low maintenance.

Step 4: Practical Turf Areas

Choose drought tolerant turf and limit the use of turf to areas of play.

Step 5: Efficient Irrigation

Set up an efficient design for the irrigation system based on the water-use zones. Water only when necessary and early morning watering is best. Try to keep every drop of water on site to prevent run-off use. Use a drip irrigation system set to a timer for efficient watering.

Step 6: Use of Mulches

Mulch traps moisture into the ground and insulates plants from the harsh seasonal air temperatures.

Step 7: Appropriate Maintenance

Use slow release, natural fertilizers. Mow lawns less during droughts to strengthen root structure. Increase height of the mowing blades by 33 percent. Thin plants rather than shear them.

Other ways to save water

- Install low-flow shower heads.
- Install a water efficient toilet. Do not use your toilet as a trash can.
- Use water and energy efficient appliances like horizontal axis laundry washers. Always look for the Energy Star logo.
- Fix leaky water pipes and faucets. A leak of one drop per second wastes 192 gallons per month.
- Turn the faucet off while brushing one's teeth and shaving.
- Greywater reuse—check with the local Health Department for legalities.
- Take showers rather than baths.
- Compost food waste instead of using a garbage disposal.

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Water Harvesting

is the capture and storage of rainfall to irrigate plants or to supply people and animals. It is one of the oldest known gardening methods.

Water harvesting dates back to the beginning of agriculture. In the desert southwest, Tohono O'odham and Hopi tribes still harvest rainwater after the onset of summer and winter rain.

Did you ever play in rainwater as a child, building earth dikes and letting them go? This is what water harvesting is all about.



Water harvesting will save you money on your water bills and

reduce your dependence on tapwater.

A well-designed water harvesting system will also decrease your irrigation needs.

All you need for a water harvesting system is rain, and a place to put it. A simple system is devised by contouring and shaping land areas so water will flow directly to vegetation. A more sophisticated system features storage to capture water for later use.

A "catchment" is any large surface, such as a roof, patio or driveway, that can capture and/or carry water to where it can be used immediately or stored. Where are your catchment surfaces? Everybody has at least one catchment on their property,

You can direct water runoff from catchment surfaces to plants, trees or lawns with dikes, berms, or by contouring. If you are storing rainwater, rain gutters or pipes can direct flow to the containers. You can then use this stored water as an alternative watering source during sparse rain periods.

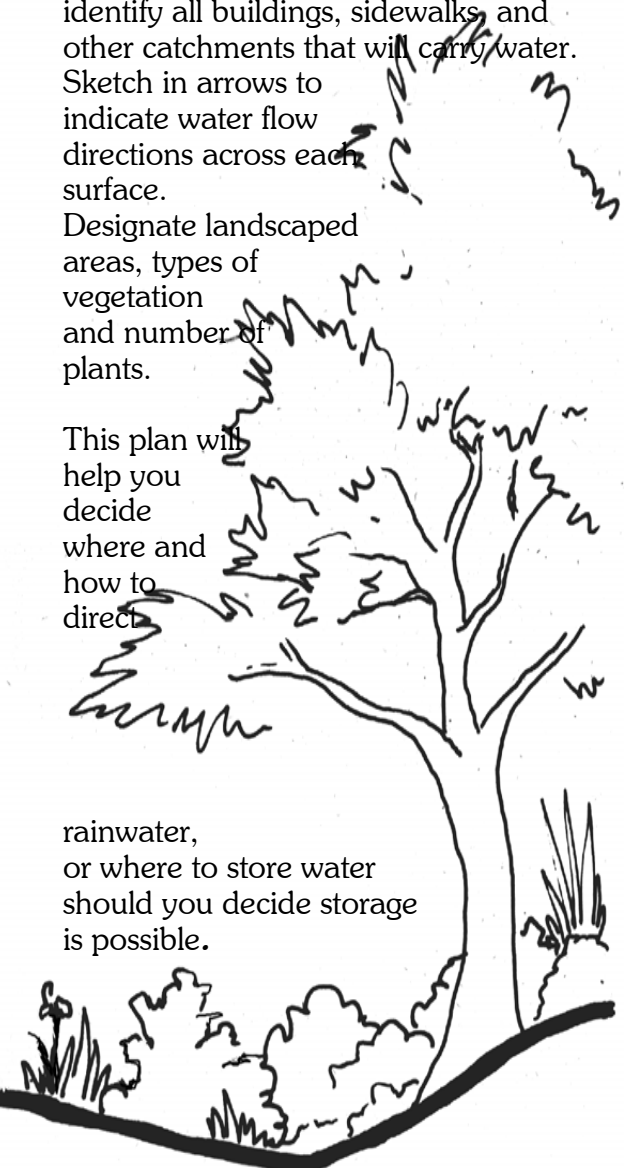
Planning Your Water Harvesting System

A site plan, drawn to scale, will be helpful in planning your water harvesting system. The plan should identify all buildings, sidewalks, and other catchments that will carry water. Sketch in arrows to indicate water flow directions across each surface.

Designate landscaped areas, types of vegetation and number of plants.

This plan will help you decide where and how to direct

rainwater, or where to store water should you decide storage is possible.



Preparing the Site

You can do many things to capture rainfall at your site:

- ◆ Create depressions around trees and line them with rock mulch to retain moisture.
- ◆ Dig furrows and channels to direct water to a garden.
- ◆ If you're designing a new home site for water harvesting, slope your paving to direct water to plants.
- ◆ Take advantage of roof water by installing gutters and downspouts if you don't already have them.

Should I Store Rainwater?

Having a water surplus available at the right time of year makes storage well worth the time and effort. A surplus becomes impractical when it must be stored for more than several months.

Water stored for long periods of time will stagnate

and become a health hazard. To determine whether storage can, or should be a part of your harvesting system, compare your total amount of water available (estimating rainfall) in a given month to that month's total landscape requirements. If you have a surplus that can be used in a reasonable amount of time, you should consider a storage system.

Types of Water Storage

You can store water in a variety of ways: 55-gallon steel drums, oak barrels or underground storage tanks. For a simple storage system, place an oil drum or barrel on a raised platform under a rain gutter downspout. The barrel should have an external pipe with a shutoff valve to control the amount of water withdrawn. If you have designed your system properly, gravity will enable you to move water from the barrel to a drip irrigation system without a pump.

System Maintenance

Regular maintenance is critical to any dependable water harvesting system. Make sure your gutters and downspouts are free of debris. Periodically clean and/or repair dikes, berms and channels to prevent excessive erosion.

With a little planning, you can make your own urban water harvesting system for landscape use, and lower your water bill.

For further information:
"Harvesting Rainwater for Landscape Use" by Patsy Waterfall



WATER
CONSERVATION
ALLIANCE OF
SOUTHERN
ARIZONA



GRAYWATER GUIDELINES

What is Graywater?

Graywater is wastewater from your laundry, bathtubs, showers, and bath sinks (lavatories). Water from your clothes washing and bathing is, for the most part, an excellent source of water to irrigate your residential landscapes and compost piles.

What Graywater is Not . . .

For the purpose of regulation in Arizona, water from kitchen sinks and dishwashers is not considered graywater. The reason for this is the potential for increased health risks associated with the organic matter commonly associated with food preparation and cooking.

Water from your toilet, which is considered blackwater, is not suitable for any reuse in or around your home. Graywater is not to be confused with reclaimed water which is water from a municipal sewer system that has been treated and then delivered to high-volume water users such as golf courses, parks and playgrounds via a separate distribution system.

Can I Use My Graywater?

In 2001, the Arizona Department of Environmental Quality (ADEQ) issued new regulations for the use of residential graywater. These new rules make it possible and feasible for the general public to use their graywater for landscape irrigation. The full text of the new straightforward, common sense rules can be found on page 21 of this booklet.

The new rules state you may legally use graywater from your clothes washers, bathtubs, showers, and bath sinks (remember, kitchen sink water is not allowed to be reused) without applying for a graywater permit, **if your answer is yes to all of the following statements:**

Yes . . .

- All my graywater originates from my own residence and is used within my property boundary for household gardening, composting, lawn watering, or landscape irrigation.
- My household generates less than 400 gallons of graywater per day (20-35 gallons per day X number of residents = the approximate amount of graywater your family creates in a day.)
- I avoid direct contact with my graywater and do not allow others to contact it directly. This means my children won't be making mudpies with this water and my pets won't play in it either.
- My graywater irrigation is only by flood or drip. I do not spray irrigate with my graywater.
- My graywater is not used on the surface for irrigation of food plants, except for citrus and nut trees.
- I don't allow my graywater to contain hazardous chemicals derived from activities such as cleaning of car parts, washing of greasy or oily rags, or disposal of waste solutions from home photo labs or home occupational activities.
- I apply my graywater to my landscape in such a way that it minimizes standing water on the surface.

- My graywater system is constructed so that in the case of a blockage, plugging or backup of the system, all my graywater can be directed into the sewage collection system or on-site wastewater treatment and disposal system, as applicable. (The graywater system may include a means of filtration to reduce the opportunity for plugging and to extend the system lifetime.)
- If I have a graywater storage tank, it is covered to restrict access and to eliminate habitat for mosquitoes or other vectors.
- My graywater system is sited outside of any flood way.
- My graywater never comes within five feet (5') of the top of the seasonally high groundwater table.
- If I use any pressure piping in my graywater system that might be susceptible to cross connection with a potable water system, the piping is clearly marked.
- My graywater does not contain water from a washing machine that is used to wash diapers or similarly soiled or infectious garments unless that graywater is disinfected before irrigation.

Why Should You Use Your Graywater? Because You Will . . .

- Use less of our valuable potable or fresh water.
- Save money on your water bill.
- Also, save money on your sewer bill. (Did you know that your sewer bill is calculated from your water use during the three winter months when outdoor use is lowest?) If you do any irrigating during December, January, and February, which many of us do to augment our less than dependable winter rains, you cut down on the volume of potable water you use, thus reducing your sewer fees, if you irrigate with graywater.
- Have the satisfaction of taking responsibility for efficient use of a valuable, finite resource.
- Be “drought proofing” your landscape by using your graywater, since more than half of the water you use indoors can be reused as irrigation water during shortages, when outdoor watering may be restricted.
- Have a constant source of water for irrigation and your compost pile, except when you are away from home.
- Possibly be adding nutrients from your graywater beneficial to your plants and to your soil.

Do Not Use Your Graywater If . . .

- You don't have sufficient space or have no plants to irrigate.
- It is not possible to access your drain pipes, making graywater use uneconomical.
- Your soil is unsuitable; it won't allow appropriate drainage and percolation of your graywater.
- Your graywater would be discharged against your house foundation, as it could cause damage to your home. Try to keep irrigation four feet from the house.
- You have a water softening system. The salts used to soften your water make it unsuitable for use on plants.
You have a family member with an infectious health condition, or if you wash diapers and don't treat your graywater.

CAN I USE MY GRAYWATER?

The Arizona Department of Environmental Quality (ADEQ) has recently issued new regulations for all types of reclaimed water.

Those regulations include new guidelines for the use of residential graywater. If you would like a copy of the new regulations you can contact ADEQ at 1-800-234-5677.

Written in non-technical terms, the regulations make it very simple and affordable for the resident to use graywater, saving money and our valuable water.

You are able to legally use graywater from your clothes washers, bathtubs, showers, and bath sinks (kitchen sinks are not allowed) without a permit if you answer yes to all the following statements:

YES, if . . .

- 💧 I use my graywater for my own private residence.
- 💧 I use my graywater directly on my own landscape for irrigation.
- 💧 My family generates less than 400 gallons of graywater per day (35 gallons per day X number of family members = how much graywater your family creates in a day.)
- 💧 I avoid direct contact with my graywater and do not allow others to contact it directly.
- 💧 All my graywater originates from my residence and is used within the property boundary for household gardening, composting, lawn watering, or landscape irrigation.
- 💧 My graywater is not used for irrigation of food plants except for citrus and nut trees.
- 💧 I don't allow my graywater to contain hazardous chemicals derived from activities such as cleaning of car parts, washing of greasy or oily rags, or disposal of waste solutions from home photo labs or home occupational activities.
- 💧 I apply my graywater to my landscape in such a way that it minimizes standing water on the surface.
- 💧 My graywater system is constructed so that in the case of a blockage, plugging or backup of the system, all my graywater can be directed into the sewage collection system or on site wastewater treatment and disposal system, as applicable.

(The graywater system may include a means of filtration to reduce the opportunity for plugging and to extend the life of the system).

- If I have a graywater storage tank, it is covered to restrict access and to eliminate habitat for mosquitoes or other vectors.
- My graywater system is sited outside of any flood way.
- My graywater system is operated so as to maintain a minimum vertical separation distance of at least 5 feet from the point of graywater application to the top of the groundwater table.
- If I use any pressure piping in my graywater system that might be susceptible

to cross connection with a potable water system, it is clearly marked.

- My graywater does not contain water from a washing machine that is used to wash diapers or similarly soiled or infectious garments unless that graywater is disinfected before irrigation.
- My graywater irrigation is only by flood or drip. I do not spray irrigate with my graywater.

Effective: January 1, 2001



Water Conservation Alliance
of Southern Arizona



printed courtesy of the U.S. Bureau of Reclamation

CAN I USE MY



GRAYWATER

?

Arizona Gray-Water Conservation Tax Credit

What is it?

Passed in the 2005 Legislative session, Arizona law provides a tax credit for the installation of a "graywater" conservation system in a residence to reclaim water.

How much is the credit for individuals?

The tax credit is 25 % of the cost of installing a water conservation system not to exceed \$1000 in the taxpayer's Arizona residence. The credit applies to the full cost of installing a water conservation system.

How much is the credit for corporations?

The corporate credit applies to the cost of installing plumbing stub outs for a separate graywater system in a residence constructed by the corporation, not to exceed \$200 per residence.

What are the limitations?

- The total amount of the credit available to all Arizona individual taxpayers is limited to \$250,000 per year.
- Only one credit in one tax year is allowed per residence. Tax credits claimed over multiple years by a taxpayer for the same residence cannot exceed \$1000.
- The total amount of the credit available to all Arizona corporate taxpayers is limited to \$500,000 per year.
- Taxpayers must apply for approval to take either the individual or corporate tax credits.
- Upon approval, taxpayers who use the credit on their Arizona tax credit may only use the credit to bring their tax liability to zero. If the amount of their allowed tax credit is greater than their tax liability for that year, the amount in excess of their liability can be applied to the subsequent year. There is a five-year limit on this "carry-forward".

How to apply for the credit?

Applications will be available on the Arizona Department of Revenue website. Go to www.azdor.gov and click on "Credit Pre-Certification" on the left column of the home page; then select "Gray Water Conservation Tax Credit".

When does the tax credit take effect?

Beginning with tax year 2007 and ending at the close of the 2011 tax year.

Questions?

Call Georganna Meyer at 602-716-6927.



THE SEVEN PRINCIPLES of XERISCAPE

Whether old or new, your landscape can be made much more water efficient by applying the principles of xeriscape.

Xeriscape means low-water-using. It does not mean dry or barren looking.

Applying the seven principles of xeriscape enables you to use natives and desert adapted plants for lovely, colorful, and shady outdoor spaces around your home.

Xeriscape's seven principles are:

Water-wise Planning and Design

Begin by making a plan for your site. Determine how you intend to use areas around your home. Identify shady and sunny areas, sloped and flat areas, and how air moves on your site. Next, divide your property into oasis-type, moderate, and low-water-use areas. The oasis area should be next to your house, where use is the most intense, to provide shade

and coolness, as well as aesthetic appeal. The lowest-water-use area will probably be at the outer edge of your property, and may include native plants already growing on the site. Once the plants in this zone are established, they need little or no water. The middle zone is a transition zone between the other two areas and uses a moderate amount of water. Plants that have a similar need for water, sun, and maintenance should be grouped together to increase irrigation efficiency and reduce maintenance time.

Low-Water-Using Plants

There are plenty of plants that use little water. You can select plants from a native or xeriscape plant list. For more information, ask at your favorite nursery for their recommendations, or look at all the plant books you can find.

Tree selection is very important because trees can provide you with years of luscious shade. They can be chosen and located to provide shade to your home in the summer months and allow the winter sun in. Use groundcovers and wildflowers to add color and texture in your landscape, and use shrubs for an accent or as a screen for privacy.

Take the time to look at good xeriscape examples in your area. The Tucson Botanical Garden, Tohono Chul Park and the Arizona-Sonora Desert Museum have beautiful xeriscaped areas. Pima County Cooperative Extension and the Arizona Department of Water Resources have additional information about xeriscaping, as does your public library.

Limit Grass Areas

Grass uses more water than anything else in the garden and also requires more maintenance, so use it only where it provides functional benefits. If you want grass just to look at, perhaps a good groundcover could better provide you that mat of green. Use grass in high-use areas, but do not use it on slopes or in hard-to-irrigate and maintain areas. A good alternative for low-use areas is seeded wildflowers or native grasses.

Water Harvesting Techniques

Incorporate water harvesting techniques into your landscape design. This means simply channeling runoff from rain to planted areas or to a container for later use. A few simple methods that direct runoff to where it is needed include sloping sidewalks and terraces, collecting roof water, contouring lawns or other sloped areas, and the use of rock "river" channels. By constructing earth mounds or berms at the edge of your property you can also hold water on your site. Locate plants where they can take advantage of this extra water.

Efficient Irrigation System & Design

Match your irrigation method to the type of plant being irrigated — drip irrigation for individual plants and spray irrigation for grass. Drip is the most efficient way to irrigate because it puts water where it is needed and reduces evaporation. Use a timer or controller to schedule irrigation and change schedules often — whenever the weather changes, especially when it rains. Put plants with similar water needs and similar rooting depth

on separate valves. Then you are not wasting irrigation water on shallow-rooted plants such as groundcovers to accommodate deep-rooted plants such as trees. Most of our soils cannot absorb water as fast as a spray irrigation system puts it out, so use low-volume spray heads to avoid runoff.

And most important, water wisely. Too much water is as bad as not enough, and in many cases is worse. Use deep, widely-spaced irrigations. This will encourage deeper rooting and more drought tolerance in plants. Water in the early morning to reduce water loss from evaporation.

Mulch

Apply mulches at the base of plants to retain moisture, keep weeds down, and control erosion. Mulches can also reduce soil compaction and salt buildup, conditions that are common to our soils. Typical mulches include compost, bark chips, and inert materials such as decomposed granite or river run rock.

Proper Maintenance Practices

Your xeriscape will not only reduce your water use, but also minimize your maintenance efforts. But, some pruning, weeding, and fertilizing will still be needed. Without good maintenance you will not achieve the water savings and appearance you want. Go easy on the fertilizer and use a slow-release type. Remember many xeriscape plants do not need any or very little fertilizer. Aerate and dethatch your lawn once a year to improve infiltration and reduce runoff. Pull up weeds because they use valuable water and fertilizer. Establish a regular maintenance

program for your irrigation system to check for leaks and damaged equipment. Be sure and fix any problems immediately or turn your system off until you can.

Water is Arizona's most precious natural resource. Through its wise use in water efficient landscaping, you preserve and protect this resource and at the same time you can have beautiful and enjoyable yards and gardens. Xeriscape yards and gardens!

Remember, xeriscape means low-water-using, it doesn't mean dry and barren looking. Applying the seven principles of xeriscape enables you to use natives and desert-adapted plants for lovely, colorful, and shady outdoor spaces around your home.

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THE SEVEN PRINCIPLES of

XERISCAPE

Xeriscape means low-water-using.
It doesn't mean dry and barren looking.

Applying the seven principles of xeriscape enables you to use natives and desert adapted plants for lovely, colorful, and shady outdoor spaces around your home.



Pre-emergence chemical herbicides are sold under names such as **Dacthal, Surflan, Weed Stopper, Treflan, Pendulum**. These products are safe if used according to label instructions and at the proper time of the year. Since pre-emergence chemicals will not affect weeds already established, they are normally applied soon after the lawn has been killed and before the rainy season in summer and winter. They won't harm most of your landscape plants.

However, if you plan to plant seeds of African Daisy or California Poppy in your former lawn area, don't use a pre-emergent.

When all else fails . . .

**READ THE INSTRUCTIONS
on your herbicide container!**



You are now ready to plant a lovely, low-water-using, low-maintenance garden where your old lawn once was. And, you can start planning your trip to Bermuda!



**WATER CONSERVATION ALLIANCE
OF SOUTHERN ARIZONA**



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Want to Get Rid of Your Bermuda Grass Lawn?



And, Eventually Save Enough Time and Money to Actually Go to Bermuda?

If you resent the high water bills you pay to keep your thirsty lawn going, and you are tired of having to mow it, dethatch it, rake it, and fertilize it, you are probably considering getting rid of all or most of your Bermuda grass lawn. Good for you!

Eliminating your lawn and replacing it with a low upkeep and low-water-using desert landscape can save you between 50% and 75% on water usage, and also free you from the boring chores that come with the maintenance of a lawn.

Bear in mind that getting rid of Bermuda isn't easy. It is one of those yard tasks that requires the use of chemicals. Although most of us are reluctant to use chemicals, they can be safely used with respect and care.

Don't bother trying to use plastic or felt paper to get rid of your lawn. They decompose rather quickly, and interfere with

water moving through the soil. And, Bermuda will grow right through these barriers anyway!

What Do I Do First?

Irrigate your lawn well during the week before you plan to apply the herbicide. Your grass needs to be actively growing when treated.

Forget the idea that if a little chemical is good, then a lot more will be a lot better. It isn't necessary or even useful for the grass to be saturated with the herbicide chemical. Use the product as intended in the instructions that come with it.

Did you know it is against the law to apply herbicide other than the way the label tells you to? Yep, it sure is.

What Should I Use?

Montsanto calls its product **Roundup**, General Control has **Doomsday**, and Ortho markets **Kleenup**. Whatever the brand name, the chemical is glyphosate, a foliar herbicide that will kill or damage most plants it contacts.

Don't attempt to use other products such as soil sterilants. They are simply too dangerous.

How Do Herbicides Work?

Glyphosate enters the plant through the leaves or green bark and moves through the plant and into the roots. This kills, not just the plant above ground, but the entire plant, roots and all.

You must be careful not to get any spray on plants close to your grass. They can easily be damaged or killed along with your Bermuda grass. However, glyphosate is not active or long-lived in the soil, so you can safely plant a tree or shrub in an area where this herbicide was recently used without injury to new plants.

Be sure the temperature is at least 80 degrees when you apply the herbicide. If rain is expected within a few hours of spraying, wait for a dry period as rain greatly reduces the effectiveness of the herbicide. Two days after you apply the herbicide, continue irrigation so the plants will continue to be active. The kill rate will be best this way.

The best time to undertake this effort is late summer when leaves are sending nutrients to the roots, or in the spring before it gets too hot.

When all else fails . . .

READ THE INSTRUCTIONS
on your herbicide container!



How Long Will It Take to Work?

Start early. It will take about ten days for the sprayed grass to die. If the grass isn't completely dead at the end of two weeks, irrigate and apply a second treatment of your herbicide.

Then What Do I Do?

Once your treated lawn is brown and dead, either scalp the lawn area using a mower set as low as possible, or rent a power rake (verticutter) and remove as much of the grass as possible.

You will want your final grade about two inches lower than any surrounding hardscape areas such as your patio or walkway.

And Finally,

Depending on what you will be doing with your former grass area, you will probably want to apply a pre-emergence herbicide to prevent weed seeds from germinating and becoming a nuisance.