Preventing Irrigation Runoff

Irrigation Management in Home Gardens

Presented by:
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HEALTHY GARDEN HEALTHY HOME

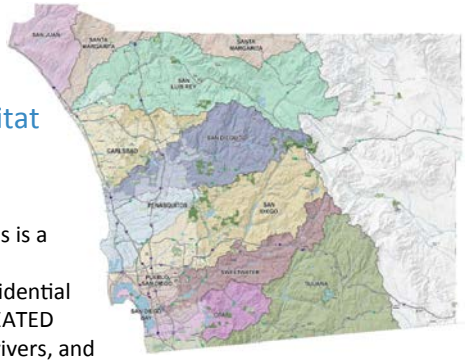
UC IPM

University of California
Agriculture and Natural Resources

San Diego County's 11 Watersheds

No matter where you live, you're in one!

- Municipal & Domestic Water Supply
- Recreation
- Wildlife and Estuarine Habitat



https://www.sandiegocounty.gov/content/sdc/dpw/watersheds/Watersheds.html

Runoff from yards, lawns, and gardens is a major contributor of pollution in our watersheds. Water released from residential properties to storm drains is NOT TREATED before it enters our local creeks and rivers, and the pacific ocean.

We Can Reduce Pollutants Entering into our Watersheds!

Watershed Protection Ordinance (WPO)

Section 67.807

"Residential discharges shall install and maintain best management practices and implement pollution prevention practices."

https://www.sandiegocounty.gov/content/dam/sdc/dpw/WATERSHED_PROTECTION_PROGRAM/watershedpdf/WPO.pdf

The Benefits of Best Practices in Home Irrigation

- Avoid Pollution

https://www.sandiegocounty.gov/dpw/watersheds/IrrigationRunoff.html

- Money Saving

"A typical San Diego household pays about **$80 a month** for water. The national average is less than $40 a month, according to a recent survey by the American Water Works Association"
www.voiceofsandiego.org/topics/government/

- Water Conservation
  - WaterSmartSD.org
  - Conservation Tips
  - Incentives and Rebates

- Plant Health

Improper watering is the #1 cause of poor plant health

Best Practices for Garden and Landscape Management

Prevent Pesticides from Entering the Storm Drain!

- **Apply pesticides when conditions are dry** and there is little wind.
- **Avoid applications to water bodies.**
- **Apply pesticides according to the label.**
- **Use the least amount of product** following the label instructions.
- **Use Integrated Pest Management (IPM) techniques** to control pests. IPM includes the use of beneficial insects, trapping and weeding.
- **Store pesticides in labeled, closed containers** in a manner that protects them from contact with stormwater.
- **Clean up pesticide spills promptly** and according to label or Safety Data Sheet (SDS) directions.

Tips for preventing fertilizers from entering the storm drain.

- **Apply fertilizer according to label's application rate** and only as much as needed for the plant.
- **Sweep up any spills.**
- **Spread fertilizer evenly over the ground** so that it does not wash away and so that it can be readily taken up by plants.
- **Use perimeter BMPs** (straw wattles, silt fences, etc.) to contain fertilizer.
- **Use mulch** to reduce the need for fertilizer.

Irrigation Systems
Proper Use & Maintenance

What Can You Do To Keep Our Waterways Clean?

- **Adjust sprinklers** so they don't spray onto streets and sidewalks.
- **Repair leaking** or broken sprinklers.
- **Water in short cycles** to allow water to absorb into the soil.
- **Water in the early morning** or late evening when it is cooler outside.
- **Replace turf** with drought-tolerant or native plants.

Irrigate Properly
Goals

- Direct Water to Plants
  - Avoid watering hard surfaces
  - Don't allow irrigation water to run into yard drains
- Water When Needed
  - Determine soil moisture with moisture meters
  - Water when top 1-2 inches of soil is dry
- Maximum Plant Health
  - Maintain <u>even</u> soil moisture according to plant needs/ season
  - Do not fluctuate between drying out and heavy watering
    - Runoff and erosion can occur more easily on dry soils

"Manual" System Maintenance
Hoses, Nozzles & Hose-end Sprinklers

- Garden Hoses & Nozzles
  - Avoid leaks
  - Good seal/fit/pressure

- Hose-end Sprinklers
  - Avoid watering hard surfaces
  - Cover yard drains to avoid flow to storm drains

- Use a Hose-bib Timer – Correctly Connected
- Use hose-end "shut-off" if not using nozzle

All sample product pictures taken from homedepot.com

Automated Systems

- Maintain systems in good order
  - Perform periodic operation audit
- Understanding your controller
- Setting Controller Timing Appropriately
  - Water as needed using moisture sensors
  - Hose-bib timer with Drip Irrigation

Understanding Your Irrigation Controller (video courtesy of Helix Water District)

Controllers for Water Saving

Number of Stations 6-18
Electric with backup battery

- Avoid over-watering:
  - Weather sensors
  - Rain & Evapo-transpiration sensors
  - Leak Detection Faults
  - Bluetooth or Wireless
  - Use with smart phones!

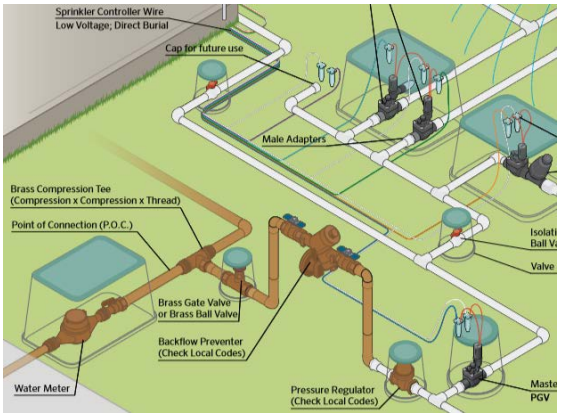
1, 2, 4, or 6 Zones
Type: Battery Operated, Fixed

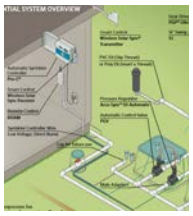
- Set "days to water" each Program
- Set "time to run" each Zone (station)
  - Topography, Soil Type
    - Cycle & Soak (some controllers)
  - Soil Moisture
  - Plant Needs

Pictured: Hunter Pro-C Residential Irrigation Sprinkler Controller + Wireless Rain Sensor; Hunter Node 100

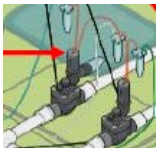
Automated System
How it Works

- Connected to water supply line between water meter and house – P.O.C.
  - Gate Valve
  - Backflow preventer – stand alone (elevated above supply line), or built into the valve = anti-siphon
  - Pressure Regulator
  - Water is held under pressure behind the sprinkler system valve or an MV (master valve)
  - 2nd in-line isolation valve or "shut-off"
  - PVC pipes connect from MV to lateral lines





Automated System
How it Works



- Programmed Controller (Clock or Timer)
  - Solenoid on each valve is wired to a "zone" on the controller
  - Electrical signal received by solenoid "opens" the valve diaphragm, water flows
  - A similar concept works to operate hose-bib timers
- Pressure (psi) & Flow (GPM or GPH)
  - Pressure or Flow Rate required is determined by the sum of the flow rates of all outlets downstream of a particular valve
    - Number of sprinklers (or emitters in drip line) and distance of run
    - Slope will increase or decrease pressure required to run zones efficiently

Types of Automated Systems
Pros & Cons

Sprinkler Irrigation	Drip Irrigation

• Broadcast Application of Water
  • Wind & Evaporation
  • More weed seed germination
• Pipes are buried (must dig trenches); Fewer Repairs
• Soil Compaction over time
  • Use Water Cycling
• Coverage
  • Better Reach & Uniformity
  • Non-uniform if not built properly & maintained
• Good for Leaching salts
• Good for "syringing" plants – pest control
• Bad in cool weather
  • Contributes to foliar & fruit diseases
	• Direct Application of Water
	  • Less impact from Wind & Evaporation
	  • Fewer Weeds
	• No Digging, Repairs more often?
	• No Soil Compaction
	• Coverage
	  • Soil moisture consistency is important for lateral water movement through soil
	• Not good on all soils - sand
	• Can't "syringe" plants
	• Best in cooler weather to avoid disease

Drip Irrigation Considerations

- Used in Non-Lawn Areas
- Water targeted at root zone
- Spigot, Valve, or Retro-fit to Sprinkler
- Output Design
  - Flow Rate = GPH (output per emitter; i.e.: .08, .09)
  - Number of plants and spacing
    - Emitter spacing (i.e.: 6", 9", 12")
- Sufficient Pressure to Run Distance/Number of Emitters
  - Check "maximum recommended lateral length for emitter spacing"
  - Typical drip operating pressure range: 10 to 45 PSI
    - Usually requires Pressure Regulator at spigot or valve
- Repairs to damage from gardening tools, foot traffic, animals

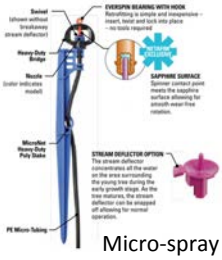
https://www.rainbird.com/homeowners/drip-irrigation-basics

Drip System Options

"punch-in" emitters

"in-line" emitters

Sprinkler Conversion



Micro-spray

Multi-port emitters

Drip System Parts & Tools

Tubing/Drip Tape

Punch & Cutter

Spigot
Connection & Timers

Direct to Valve

Flush valve, connectors, check valves, clamps, etc.

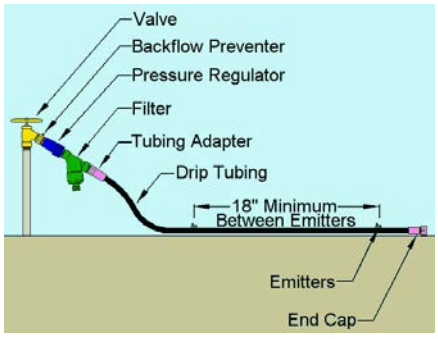
Drip Installation Basics

Rain Bird low flow valve & pressure regulating filter

- Connect LFV (low flow valve) or Tubing to Water Source
  - Use filter and pressure regulator between valve and distribution tubing
  - Can install splitter (with shut offs) after pressure regulator for 2 lines
- Run Tubing
  - Within 3-5 ft. of plants to be watered if using punch-in emitters
  - Around/very near "drip-line" of root zone for each plant if using in-line emitters
- Install emitters
  - Flow rates vary (color coded or in-tube)
    - .5 gal – 2 gal per hour
  - Punch-in consists of emitter, ¼" tubing & stake

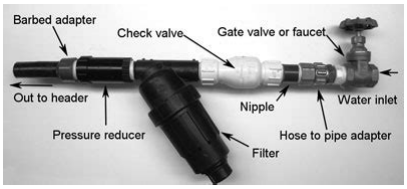
Rain Bird in-line shut-off

Typical drip system connection at hose-bib (spigot)



https://www.greenmylife.in/drip-irrigation/

A pressure regulator is more expensive than a pressure reducer, but the outlet pressure can be adjusted by turning a bolt on the regulator.



NMSU: Low-Pressure Drip Irrigation for Small Plots and Urban Landscapes

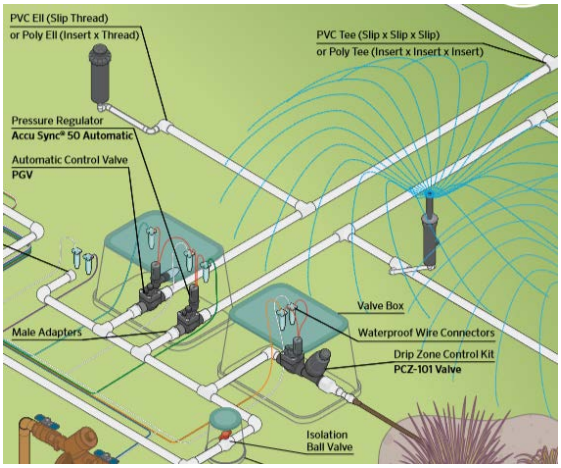
Always install components of the manifold with flow arrows (stamped on check valves, pressure reducers, filters, and other components) pointing downstream to match the direction of water flow.

Typical drip system connection to a valve
- Using a Battery Powered Controller

- These valves can be purchased with filter and pressure regulator included
- Solenoids used with battery powered controllers are typically DC Latching Solenoids

Automated Sprinkler Systems
Parts

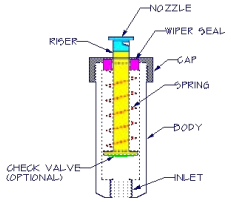
- PVC Pipe
  - Sizes 1”, ¾”, ½”
  - Pipe Schedule – Sched 40
    - Must use the same size and schedule when repairing a line
  - Isolation Ball-valve
- PVC Joints (thread/slip)
  - Elbows – used for turning 90^0 corner
  - T’s – for adding lateral lines
- Swing Joints at Sprinklers – allow movement in sprinkler body; reduces breakage



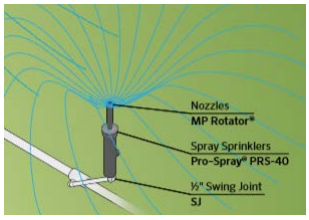
Automated Sprinkler Systems

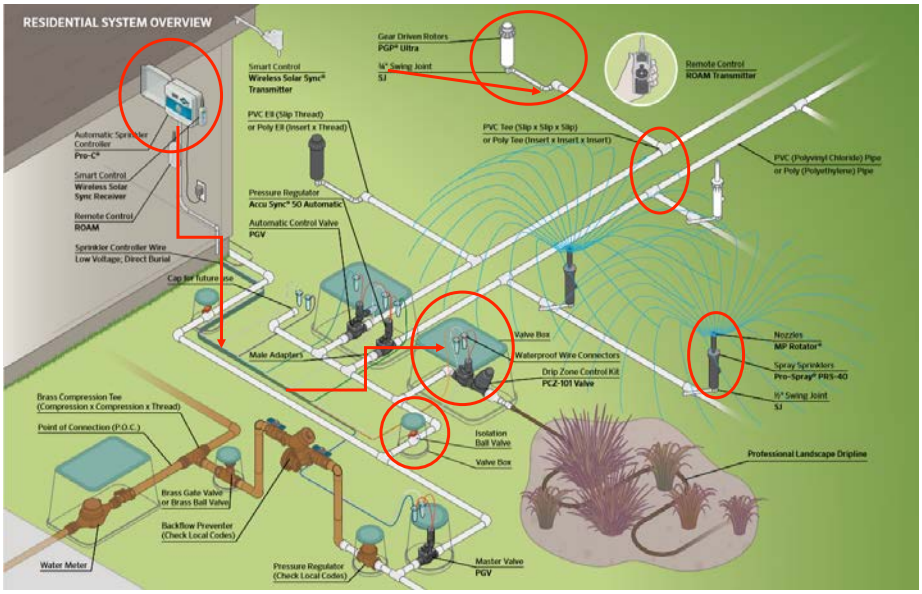
Parts

- Sprinkler Body
  - Pop-up or stationary mounted at the top of a "riser pipe" (gray for UV's)
  - Check valves – inside body to keep water draining down to the lowest point from leaking out
- Nozzles
  - Removable from body
  - Many options
  - Types designed for specific use and area or adjustable for arc & radius; 360^0, 180^0, 90^0 angles



PARTS OF A POP-UP SPRINKLER





http://factsheets.okstate.edu (diagram courtesy of Hunter Industries)

Resources -
Design & Install, System Maintenance, Repair

Residential System Design Guide (Hunter Ind.)

Landscape Irrigation Design Process – RainBird Services

How to Install an Irrigation System – YouTube (K-Rain Irrigation Products)

A Homeowner's Guide to a Water Smart Landscape (San Diego County Water Authority)

Classes (bewaterwise.com)

How to Take Care of Your Irrigation System |Toro Yard Care Blog

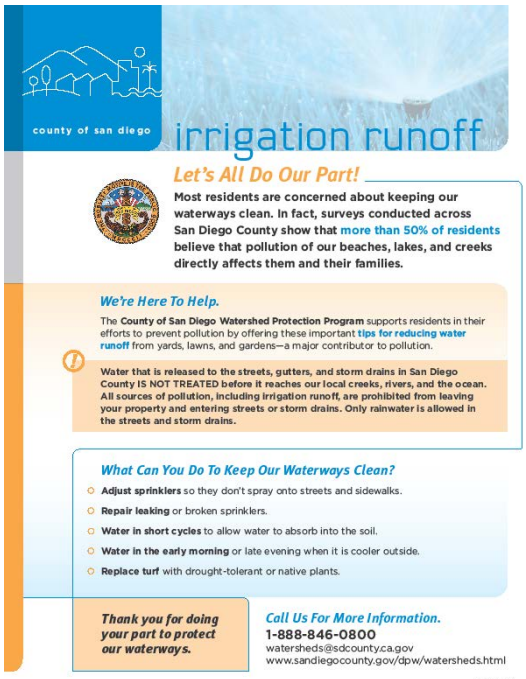
All About Sprinkler Systems | Rain Bird (series of videos on all topics irrigation)

Micro Irrigation (drip) (Hunter Ind.)

Drip Irrigation Basics | Rain Bird

Irrigation Runoff is Prohibited

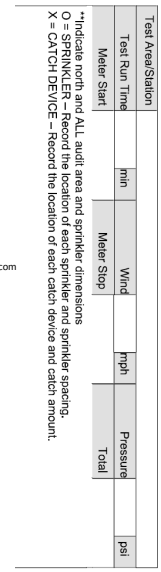
From leaving your property and entering the storm drain.



Auditing Sprinkler Systems
"How To"

Irrigation Audit Guidelines (Irrigation Association)

- Specified Run Time:
  - Put out collection cans (same size and shape)
  - Heads & Nozzles operating correctly?
  - Nozzle output patterns correct?
    - **Arc** (90^0 – 360^0) & **Radius** (distance)
    - Is there "head to head" coverage?
  - Pop-ups (sprinkler body) operating correctly?
  - Check valves in place and operational on slopes?
- Observations:
  - Is run-off occurring? Why?
  - Is sprinkler height appropriate for plant height?
- Audit should inform adjustments, maintenance, repairs



Adjustments – Avoid Runoff
"How To"

- Run Time
- Number of Runs (cycle-soak)
- Sprinkler Body Height
  - Pop-ups
  - Risers
- Nozzle Operation
  - Clean and Replace
- Sprinkler Parts
  - Clean and Replace
- Plant Maintenance?

Hunter MPTFSCREEN Filter
MP Rotator

Pop-up/body
Homedepot.com

Toro 12" pop-up sprinkler

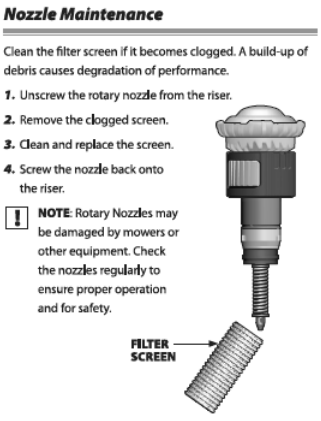
1/2" PVC Risers; Schedule 80

Adjustments – Avoid Runoff

- Consider changing to more efficient nozzles

Adjustments – Avoid Runoff
"How To"

- Clean nozzle filters (ie: rotary nozzle)



Nozzle Maintenance

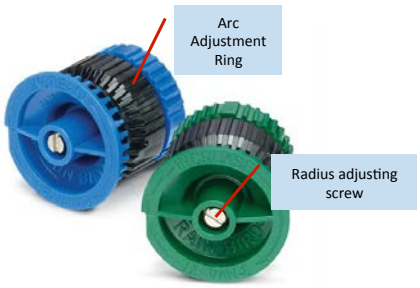
Clean the filter screen if it becomes clogged. A build-up of debris causes degradation of performance.

1. Unscrew the rotary nozzle from the riser.
2. Remove the clogged screen.
3. Clean and replace the screen.
4. Screw the nozzle back onto the riser.

NOTE: Rotary Nozzles may be damaged by mowers or other equipment. Check the nozzles regularly to ensure proper operation and for safety.

Rain Bird VAN: Variable Arc Nozzle

https://www.youtube.com/watch?v=sL1JsluDxJo



Adjusting a Hunter Rotor: Right Stop Adjustment

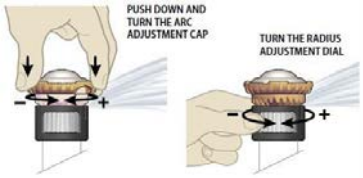
https://www.youtube.com/watch?v=d4c0IjeyYek

Hunter
MP Rotator Nozzle
Adjustment

https://www.youtube.com/watch?v=yWOzlEbbYJM

Rain Bird R-VAN
Adjustable Rotary
Nozzle

https://www.youtube.com/watch?v=VtTg0LodNzQ




homedepot.com

Minor Leaks & Repairs
"Tools and Materials"


homedepot.com

- Tools
  - Round-point or Trenching Shovel and Trowel
  - Tarp or burlap for sod and soil from the hole
  - PVC Pipe Cutter
  - Rags
- Materials
  - PVC Primer & Glue
  - ½", ¾", 1" Pipe and Couplings
  - Flex-Joints
  - New sprinklers and/or parts (body, nozzle, filter)

https://www.irrigationtutorials.com/irrigation-sprinkler-head-selection/

Sprinkler on a Swing (Flex) Joint
"Parts"

www.hunterindustries.com

- Allows easy adjustment of sprinklers to proper height and position; eliminates broken risers.
- Allows for placement of sprinkler at grade.
- Allows for replacement of sprinkler without digging all the way down to the pipe.
- Always turn the PVC T-joint in an upward facing position to allow for maximum movement of swing joint when replacement is necessary.

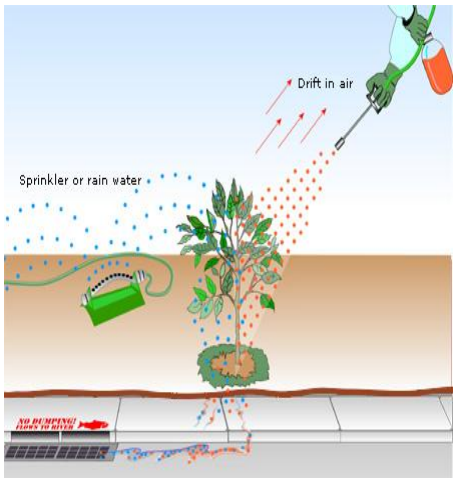
Using A Compression Coupling To Repair Broken PVC Pipe

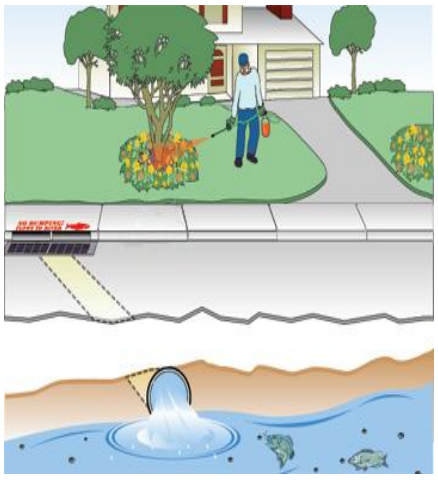
Ewing Irrigation & Landscape Supply, Feb 25, 2014

Repair & Replace Broken Irrigation "TIPS"

- Dig to give yourself room to work
  - 6-8" diam. around a sprinkler body
  - 3"- 4" below area of pipe leak
  - A trowel is better than a shovel for this
- Clean off the parts to be fixed for good visual of the leak (break)
- Shut-off water at isolation ball-valve
  - Wait to shut-off water until you've determined where the leak is
  - DO NOT remove sprinkler body or cut pipe until water is off!
- Use pipe cutter to make clean cuts. Be careful not to allow debris/soil into cut ends of pipe.
- Do not put too much upward pressure on the buried sections of the pipe.
- Allow glue to dry before opening isolation valve and running a test to check the repair does not leak.
- Back-fill should be firm to avoid sinking later.

Water from our gardens and landscapes carries soil, sediment, fertilizers, pesticides and herbicides when it runs off of our property and flows in to the storm drain system. This runoff water remains untreated before flowing in to our watersheds.



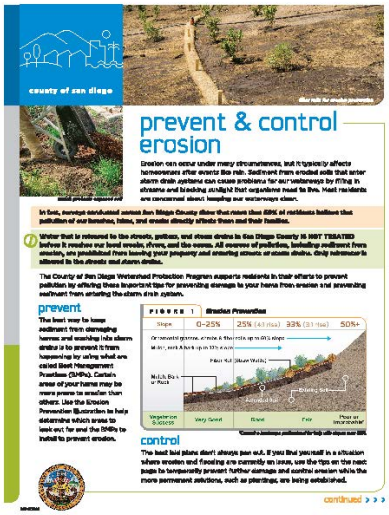


Prevent & Control Erosion

Sandbags: Temporarily create a barrier to keep eroded soil and water away from property and roads.

Fiber Rolls (Straw Wattles): Reduce how quickly water moves over an area and help trap sediment.

Mulch: Temporarily protect exposed soil from erosion by rain and wind.



It's The Water That Connects Us!

What Can You Do To Keep Our Waterways Clean?

- **Redirect sprinkler heads** away from your yard drain.
- **Use dry methods** such as sweeping to clean your yard and patio.
- **Hose down items** such as patio furniture **away** from your yard drain.
- **Temporarily cover your yard drain** with a bowl or mat when watering.
- **Water in short cycles** to allow water to absorb into the soil.
- **Avoid application of fertilizers** and pesticides prior to rainfall.

- **Yard drains are intended to carry storm water from your property to the storm drain. They are not meant to carry water from other sources, like irrigation runoff or wash water from your property.**

http://www.projectcleanwater.org

Useful Phone Numbers:

- Unused Pesticide Disposal: 1-800-CLEANUP
- UC Master Gardener Hotline: (858) 822-6910
- UC Cooperative Extension: (858) 822-7711
- Agricultural Commissioners' Office: (858) 694-2739

Resources for this presentation include:

University of California, Agriculture and Natural Resources.

http://ipm.ucanr.edu/

http://www.projectcleanwater.org

Watershed Protection Program (sandiegocounty.gov)

WaterSmartSD.org

http://factsheets.okstate.edu

https://irrigation.org/ (Irrigation Association)

https://rainbird.com/

https://www.youtube.com/ (for videos from various industry sources)

Hunter Industries, Rain Bird Corporation, Ewing Irrigation, and other product pictures, videos, and examples are courtesy of those suppliers. Use of these product images, or any others, as examples of the topic and information contained herein are not an endorsement of any brand, product type, or supplier nor should be construed as recommendation of brand, product type, or supplier. Photographs and video links provided courtesy of these entities via the internet.

Thank you for joining us today!

A brief survey will be sent to you following this workshop. Your participation is appreciated!

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More 2020-2021 Zoom Workshops
10:00 a.m. – 11:30 a.m.

	2021
Feb. 6	**Beginning Gardening**
Feb. 20	**Salsa Gardening**
March 6	**Herb Gardens for Cooking**
April 3	**Irrigation - Managing Runoff**
April 24	**Salsa Gardening**
May 15	**Controlling Ants the Healthy Way**

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