

Green Industries of Colorado Partners with the Colorado WaterWise Council



International Irrigation Show
San Antonio, Texas – November 7, 2006

Technical Session Overview

~ Partners in Delivering Water Conservation and Water Quality Protection Education

- Introduction to Green Industries of Colorado
 - GreenCO's BMP Training and Certificate Program
- Introduction to Colorado Water Wise Council
 - How the partnership was formed
- Introduction to Town of Castle Rock
 - Landscape Rules and Regulations
- Program accomplishments and testimonials
- Q & A

An Introduction to the Green Industries of Colorado (GreenCO)

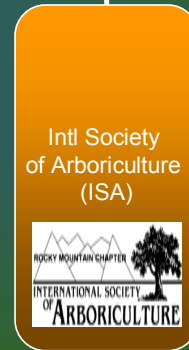


- GreenCO Overview
- GreenCO's Conservation Goals
- History of Best Management Practices (BMP) Development
- Overview of GreenCO BMPs
- A Snapshot of the BMP Training Program

Who is GreenCO?

**Represents over
2,000 Member
Companies**

**35,000+ Employees
throughout Colorado**



An alliance of seven organizations representing the common interests of landscape-related trades.

What is GreenCO?

- Unified organization preserving Colorado's built landscapes.
- Represents urban agriculture, providing a variety of goods and services in both wholesale and retail markets statewide.
- Voice for more than 2,000 small, medium and large wholesale, retail and agri-business member companies and their 35,000 employees in Colorado.
- Contributes nearly \$2 billion to Colorado's economy.

Why Does Water Conservation Matter to the Green Industry?

- **Water is a limited resource.**
- **Water use increases with population growth.**
- **Improving urban water use efficiency aids in meeting increased demand.**
- **Water conservation: “Using less water to satisfy a particular purpose”- does not mean eliminating attractive landscapes.**
- **Sustainable growth is critical to the green industry.**

(Less Water - LESS WORK - Less business)

Why Does Water Quality Matter to the Green Industry?

Reduce non-point source pollution by:

- Reducing runoff
- Encouraging vegetative buffers use
- Applying chemicals more efficiently
- Educating the end-user about water quality



Reduce pollution at the source rather than correcting the impacts.

GreenCO's Water Program

Mission:

“To inform, encourage, and instill the practice of sound water use across Colorado and ensure that built landscapes remain an essential foundation of Colorado's quality of life, economic health and public image.”



GreenCO's Water Program

As the most visible user of outdoor water, our goal is to provide industry-driven leadership to help address water issues proactively and identify solutions to landscape water waste and pollution.

Development and application of Green Industry "Best Management Practices" helps the industry respond to challenges posed by water shortages caused by population growth and drought.

Creating BMPs

First Step to Meet Goals

How?

- “Get our house in order”
- Inventory, evaluate and adopt industry-wide standards
- Integrate BMPs into training programs and public outreach
- Develop recognition for training



What are BMPs?

- For our purposes, **B**est **M**anagement **P**ractices are:

“Voluntary activities undertaken to reduce water consumption and protect water quality.”
- Term is widely used by many local, state and government agencies.

GreenCO Developed these BMPs Because We Realize:

- Healthy landscapes enhance water quality and the environment.
- Over-irrigation is the primary source of water waste in landscaping.
- Preventing or reducing pollution at its source is easier than correcting its impacts.
- Improved water quality and conservation are dependent on behavior changes.

GreenCO BMP Manual

Revised
May 2004

Spanish
December 2005

Practicing and promoting
water conservation is
essential for the success
of the Green Industry!

Drought Practices for Nurseries, Greenhouses and Growers
Drought Practices for Landscape Management
Drought Practices for Nurseries, Greenhouses and Growers
Education of Employees
Education of the Public
Fertilizer Application
Irrigation Efficiency (General Principles)
Irrigation System Design
Irrigation System Maintenance
Installation and Maintenance
Lawn Aeration
Lawn Mowing
Mulching
Park, Golf Course and Other Large Landscape Design and Management
Pesticide and Herbicide Application
Pesticide, Fertilizer and Other Chemical Storage, Handling and Disposal
Plant Selection and Placement
Production Practices

**Green Industry
Best Management Practices (BMPs)
for the Conservation and Protection
of Water Resources in Colorado**

Prepared for
The Green Industries of Colorado (GreenCO)
3139 E. Yale Circle, Suite 201
Denver, CO 80222

Prepared by
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2490 West 24th Avenue, Suite 105A
Denver, CO 80211

With support from:
The Colorado Water Conservation Board
HydroWater Consulting, LLC
Colorado Department of Public Health and Environment
Water Quality Control Division
(under a grant from the U.S. Environmental Protection Agency)



2ND RELEASE, MAY 2004
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Green Industries of Colorado - www.greenco.org

Colorado Governor
Bill Owens
issued a
Green Industry
“BMP” Proclamation
December 9, 2005

“BMP Awareness Week”
December 12-16, 2005

Honorary Proclamation



BILL OWENS
GOVERNOR

GREEN INDUSTRY BEST MANAGEMENT PRACTICES
AWARENESS WEEK
December 12 – 16, 2005

WHEREAS, the issue of water management and conservation is of the utmost concern and priority for the state of Colorado, to ensure our quality of life and economic viability; and

WHEREAS, Colorado's ability to recognize and implement management practices for water users that utilize the best of technology, design, and material use – based on Colorado's climate and soil conditions to conserve and manage water use in our environment – is highly advantageous; and

WHEREAS, the Green Industries of Colorado, in conjunction with representatives from Colorado State University Cooperative Extension, Colorado State University Department of Horticulture and Landscape Architecture, Colorado Water Resources Institute, Denver Water, and the Northern Colorado Water Conservancy District, have developed practices – through both the science and practical application of landscape or outdoor urban water use – that provide both efficiency and flexibility for planning agencies at the local and state level, as well as individual property owners, to maximize water use while preserving viable landscape options; and

WHEREAS, these best management practices (BMPs) are an evolving set of guidelines and standards, which will take advantage of future technological developments and future refined water practices, that can be adopted by local, county, and state agencies as a goal for water management and conservation; and

WHEREAS, BMPs are state-of-the-art practices for water conservation and water quality protection that help to ensure the future viability of our great state;

Now Therefore, I, Bill Owens, Governor of the State of Colorado, do hereby proclaim December 12 – 16, 2005,

GREEN INDUSTRY BEST MANAGEMENT PRACTICES
AWARENESS WEEK

in the State of Colorado.

GIVEN under my hand and the Executive Seal of the State of Colorado, this first day of December, 2005

Bill Owens.

Bill Owens
Governor

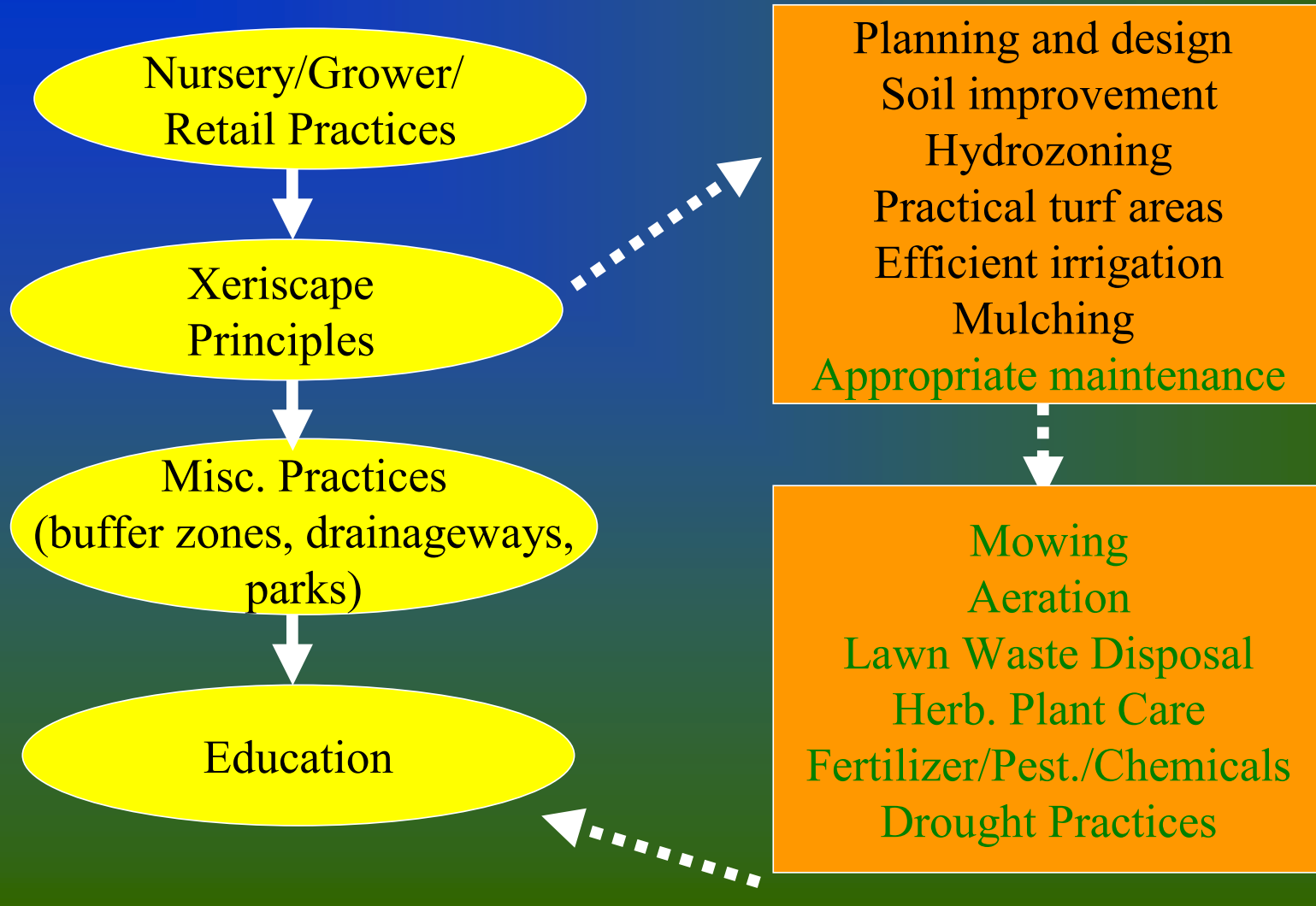


GreenCO's 31 BMP Fact Sheets

Basis of BMP Training

- Drought Practices for Landscapes
- Drought Practices for Nurseries, Greenhouses and Growers
- Education of Employees
- Education of the Public
- Fertilizer Application
- Herbaceous Plant Care
- Irrigation Efficiency (General)
- Irrigation System Design
- Irrigation System Installation
- Irrigation System Maintenance
- Landscape Design
- Landscape Installation and Erosion and Sediment Control
- Landscape Maintenance
- Lawn Aeration
- Lawn Waste Disposal/Composting
- Mowing
- Park, Golf Course and Other Large Landscape Design/Management
- Pesticide/Herbicide Application
- Pesticide/Fertilizer/Chemical Storage, Handling and Disposal
- Plant Selection and Placement
- Production Practices for Nurseries, Greenhouses and Growers
- Regulatory Awareness/Compliance
- Retail Practices for Nurseries, Greenhouses and Garden Centers
- Revegetation of Drainageways
- Riparian Buffer Preservation
- Soil Amendment/Ground Preparation
- Turf Management
- Water Budgeting
- Woody Plant Care
- Xeriscape

BMP Workflow



Water Conservation Practices Starts with Nurseries, Greenhouses & Growers

1. Reduce wasted water/runoff
 - Hydrozoning
2. Examine/improve irrigation system efficiency
 - Irrigation technology (e.g., drip, subirrigation)
3. Collect and reuse/recycle irrigation water
 - Increase attention to disease prevention practices and salt/nutrient build-up

Properly Use Technology to Maximize Irrigation Efficiency

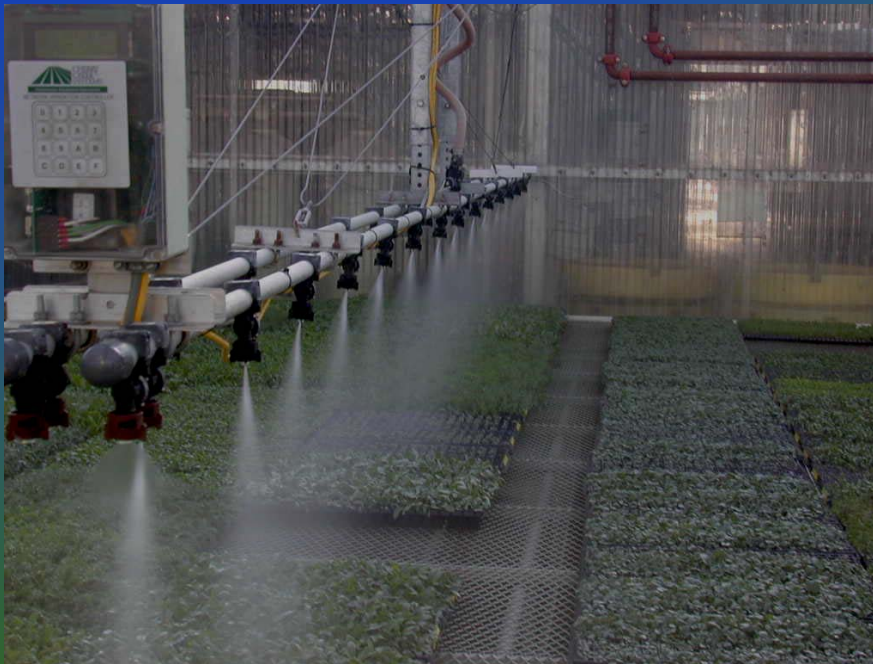
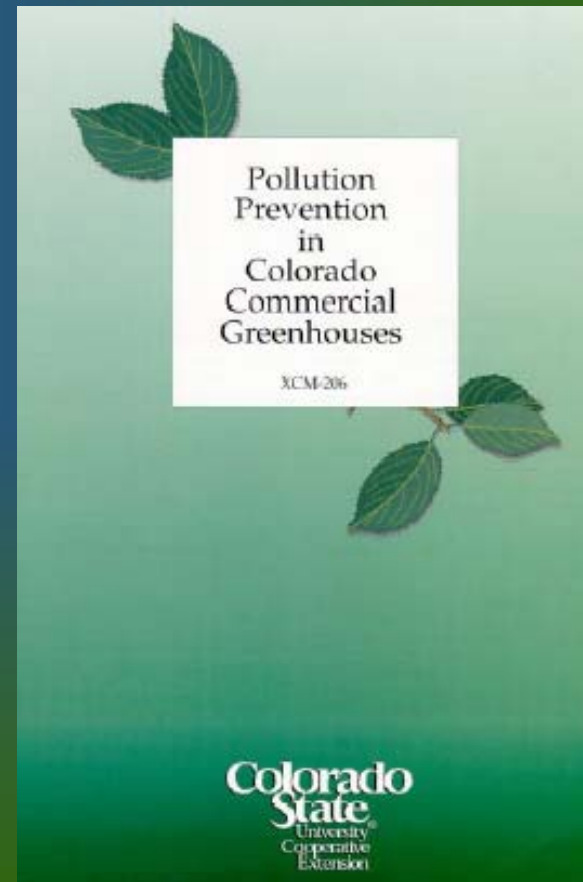


Photo Source: Little Valley Wholesale Nursery.

Overview of Pollution Prevention in Greenhouses/Nurseries

- Manage irrigation systems to reduce transport of chemicals.
- Use IPM/PHC in pest control decisions.
- Apply pesticides only when needed.
- Maintain records of pesticide use.
- Protect groundwater/ surface water from leaks/spills.
- Protect wellheads from contamination.



Seven Principles of Xeriscape™

1. Planning and design
2. Soil improvement
3. Hydrozoning
4. Practical turf areas
5. Efficient irrigation
6. Mulching
7. Appropriate maintenance



*Xeriscape is a term copyrighted by Denver Water in 1981. Permission to use granted.

Planning and Design

(Xeriscape Principle 1)

- Select the right plants
- Place in the right spot
- Group by water need
- Space properly to avoid excessive water use.



Photo Source: Valerian, Ilc and Engle Homes 2003

Examples of Industry Tools to Aid in Plant Selection

**PUT SOME eXCITEMENT
IN YOUR YARD!**

A Guide To Xeriscape™ Gardening



Look for the X-Rated Xeriscape™ Gardening logo above. It's your sign to successful gardening.

Xeriscape is a trademark of Denver Water, Denver, CO and is used here with permission.



ANNUAL & PERENNIAL
Plant Guide



GENA

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ALCC Award-Winning Xeriscape Landscape Designs



Source: Alpine Gardens, Williams Residence.



Source: Viriditas, Garden of the Aerie

Xeriscape™

IS....



IS NOT....



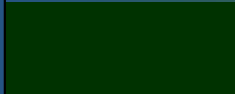

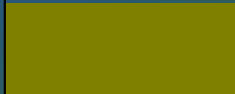

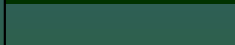

Source: Xeriscape™ Colorado



Soil Amendment and Ground Preparation

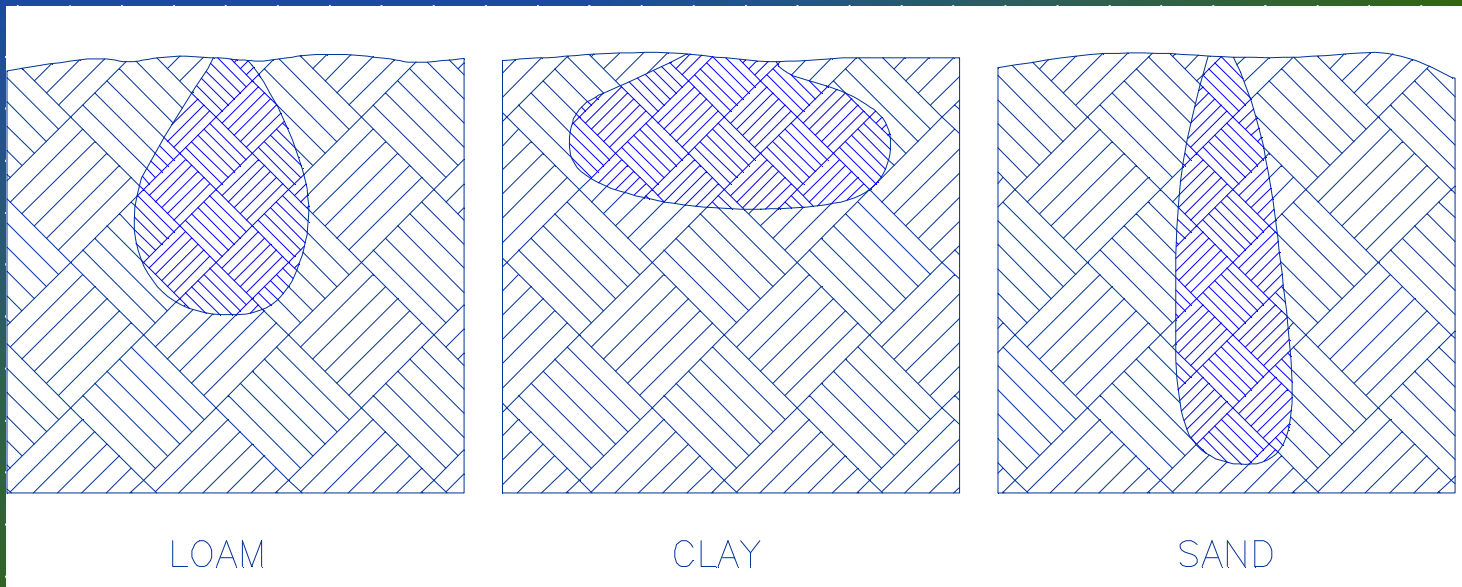
(Xeriscape Principle 2)

- Test soils to identify needed improvements (e.g., texture, nutrients, salts, pH)
- Proper soil preparation is critical to landscapes
 - 3-5 c.y. (1-2 inches) organic matter per 1,000 sq. ft., tilled 4-6 inches
- Preserve topsoil for reuse.

Soil Horizon	Amendment Level
	Worst: No amendment/no tilling
	
	Bad: Amendment/no tilling
	
	
	Good: Amendment/ tilling 4-6"

Soil Properties Affect Irrigation Requirements

- Organic matter improves the aeration of clay and the water-holding capacity of sand.



Graphic Source: Stephen Smith, Aqua Engineering.

Hydrozoning

(Xeriscape Principle 3)

- Group plants with like water needs
- Place low-water ground covers in difficult maintenance areas (steep slopes, narrow strips)
- Place low-water plants at top of slopes



Photo Source: www.xratedgardening.com

Water Budgeting

Knowing how much water you need +
Knowing how much water you use =
Knowing WHEN & HOW to adjust your system

- Not as complicated as it sounds
- Irrigating according to plant needs
- Need to understand ET
 - Water lost from soil/plant surfaces (evaporation)
 - Water used by plants (transpiration)

GreenCO Water Budget Calculator

(www.greenco.org)

Enter your Data in the White Areas

greenco
it's easy being green™

Name: Enter Customer's name
 Acct #: 999999
 Address: 99 Any Lane, My City
 Agency: nowed

1 Home/Interior Water Consumption Estimate

Number of Residents: 1 Persons
 Low Flow Plumbing?: Yes

2 Landscape Water Consumption Estimate

Turf Area: 1,000 sq.ft.
 Shrub/Ground cover Area: 1,500 sq.ft.
 Xeriscape Area: 0 sq.ft.
 Or Total Area: 0 sq.ft. OK

Automatic Sprinklers?: Yes

3 Total Water Budget

Restriction Budget: 0 % Target

* Units in Gallons

Defaults Area	Local Average ET (in) (enter if different than default)	Actual Usage*	Base Year Use
0.00	Jan 0.00	9,520	9,000
0.00	Feb 0.00	7,850	8,000
0.00	Mar 0.00	12,890	12,500
4.00	Apr 4.00	24,700	24,500
4.95	May 4.95	25,620	25,500
6.20	Jun 6.20	28,990	29,000
6.60	Jul 6.60	40,125	40,000
5.50	Aug 5.50	38,600	39,000
4.00	Sep 4.00	34,256	34,000
2.80	Oct 2.80	32,890	33,000
0.00	Nov 0.00	16,456	12,000
0.00	Dec 0.00	9,900	9,000

2a. Acres to Sq.Ft. Calculator:

Enter Acres: 2.00 87,120 sq.ft.

Provided by GreenCo and the Colorado Landscape and Nursery Businesses Association © 2003 Conser/Vision

Home or Single Meter Water Budget Calculator

Data in blue boxes comes from the "Input Table"

greenco
it's easy being green™

Site Info

Name: Enter Customer's name
 Acct #: 999999
 Address: 99 Any Lane, My City
 Agency: nowed

1 Home/Interior Water Consumption Estimate

Number of Residents: 1 Persons
 Low Flow Plumbing?: Yes
 Gallons Per Home Per Day: 66

2 Landscape Water Consumption Estimate

Turf Area: 1,000 sq.ft.
 Shrub/Ground cover Area: 1,500 sq.ft.
 Xeriscape Area: 0 sq.ft.
 Or Total Area: 0 sq.ft. OK

Automatic Sprinklers?: Yes

3 Total Water Budget

Restriction Budget: 0 % Target

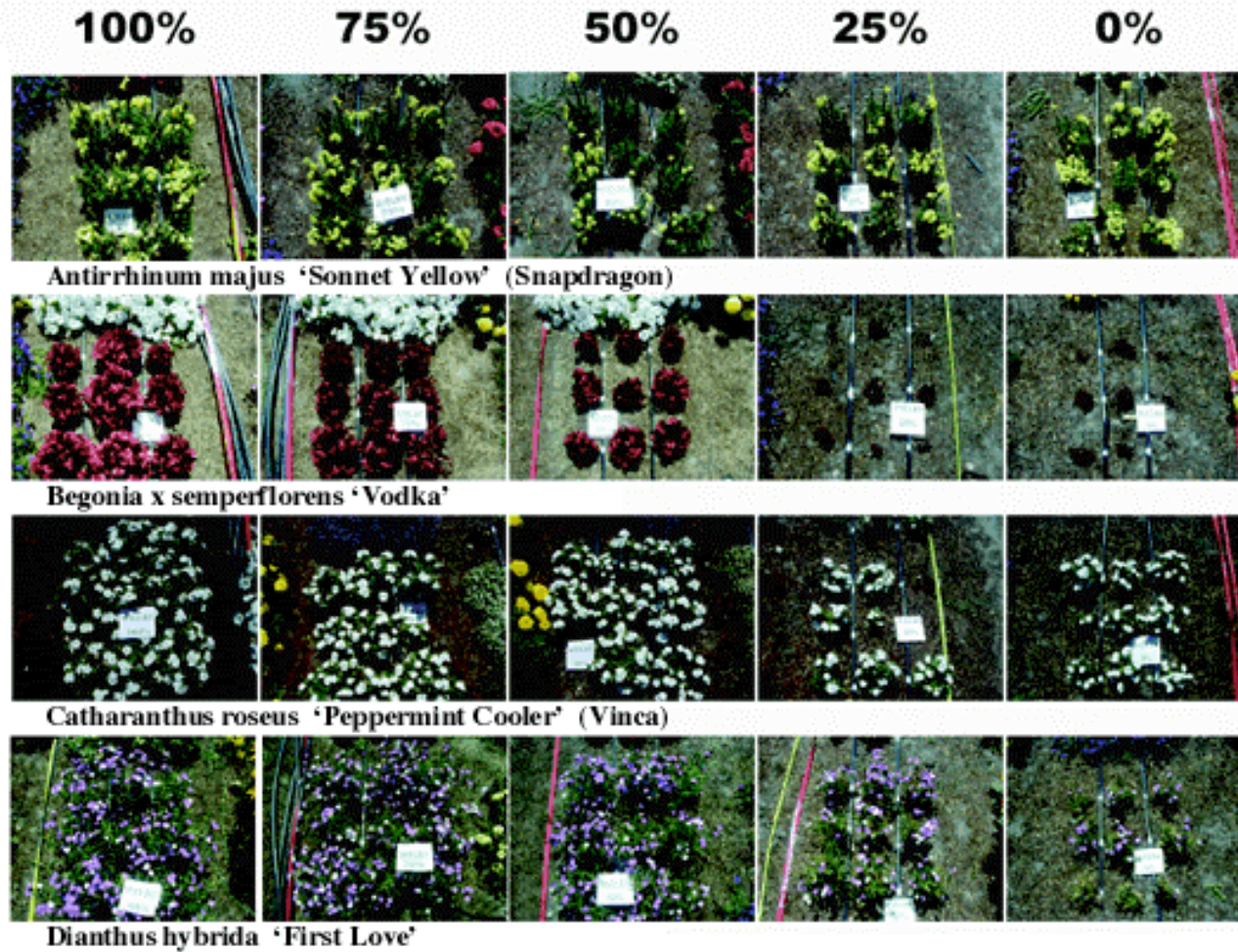
* Units in Gallons

Month	Indoor Allocation	Landscape Allocation	Total Allocation	Actual Usage	Savings Potential	Drought Budget	Base Year Use
Jan	1,850	0	1,850	9,520	7,870	1,850	9,000
Feb	1,850	0	1,850	7,850	6,200	1,850	8,000
Mar	1,850	0	1,850	12,890	11,040	1,850	12,500
Apr	1,850	5,115	6,765	24,700	17,935	6,765	24,500
May	1,850	6,330	7,960	25,620	17,640	7,960	25,500
Jun	1,850	7,928	9,578	28,990	19,412	9,578	29,000
Jul	1,850	8,440	10,090	40,125	30,035	10,090	40,000
Aug	1,850	7,033	8,683	38,600	29,917	8,683	39,000
Sep	1,850	5,115	6,765	34,256	27,491	6,765	34,000
Oct	1,850	3,581	5,231	32,890	27,660	5,231	33,000
Nov	1,850	0	1,850	16,456	14,806	1,850	12,000
Dec	1,850	0	1,850	9,900	8,250	1,850	9,000

Provided by GreenCo and the Colorado Landscape and Nursery Businesses Association © 2003 Conser/Vision

How Much Water Do Plants Really Need?

Hardy Boy Bedding Plant Annuals Top 20 Water Efficiency Study (Welby Gardens and CSU 2003)



Create Practical Turf Areas

(Xeriscape Principle 4)

- Value of turf:
 - Provides recreational benefit, good for high-use areas
 - Reduces wind and water erosion.
 - Provides cooling effect.
 - Filters and infiltrates runoff.
 - Aesthetics.
- Consider alternatives for narrow strips, hard-to-water and hard-to-maintain areas (steep slopes).



Photo Source: Valerian, llc and Engle Homes 2003

Irrigation Efficiency

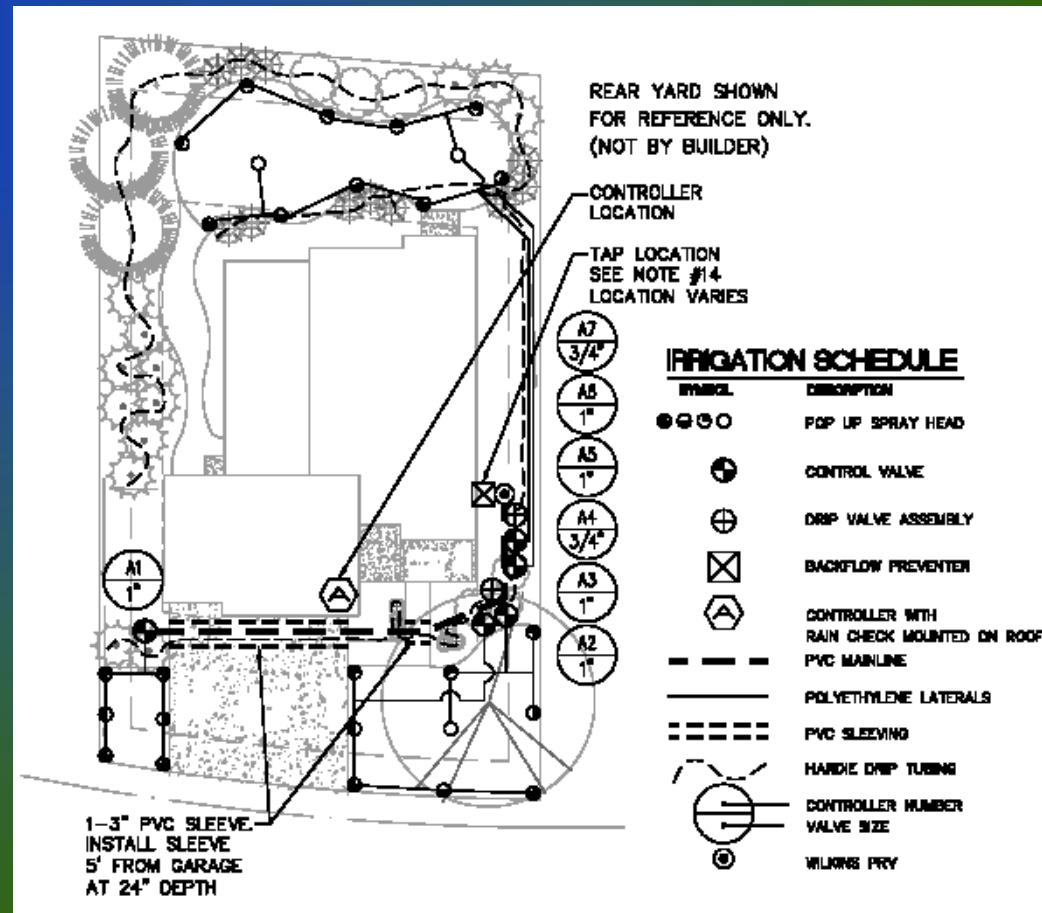
(Xeriscape Principle 5)

1. Assure the overall quality of the system.
2. Design the system for the efficient and uniform distribution of water.
3. Install the system to meet design criteria.
4. Maintain the system for optimum performance.
5. Manage the irrigation system to respond to the changing need for water.

Source of Recommendations: The Irrigation Association

Efficient Irrigation Design

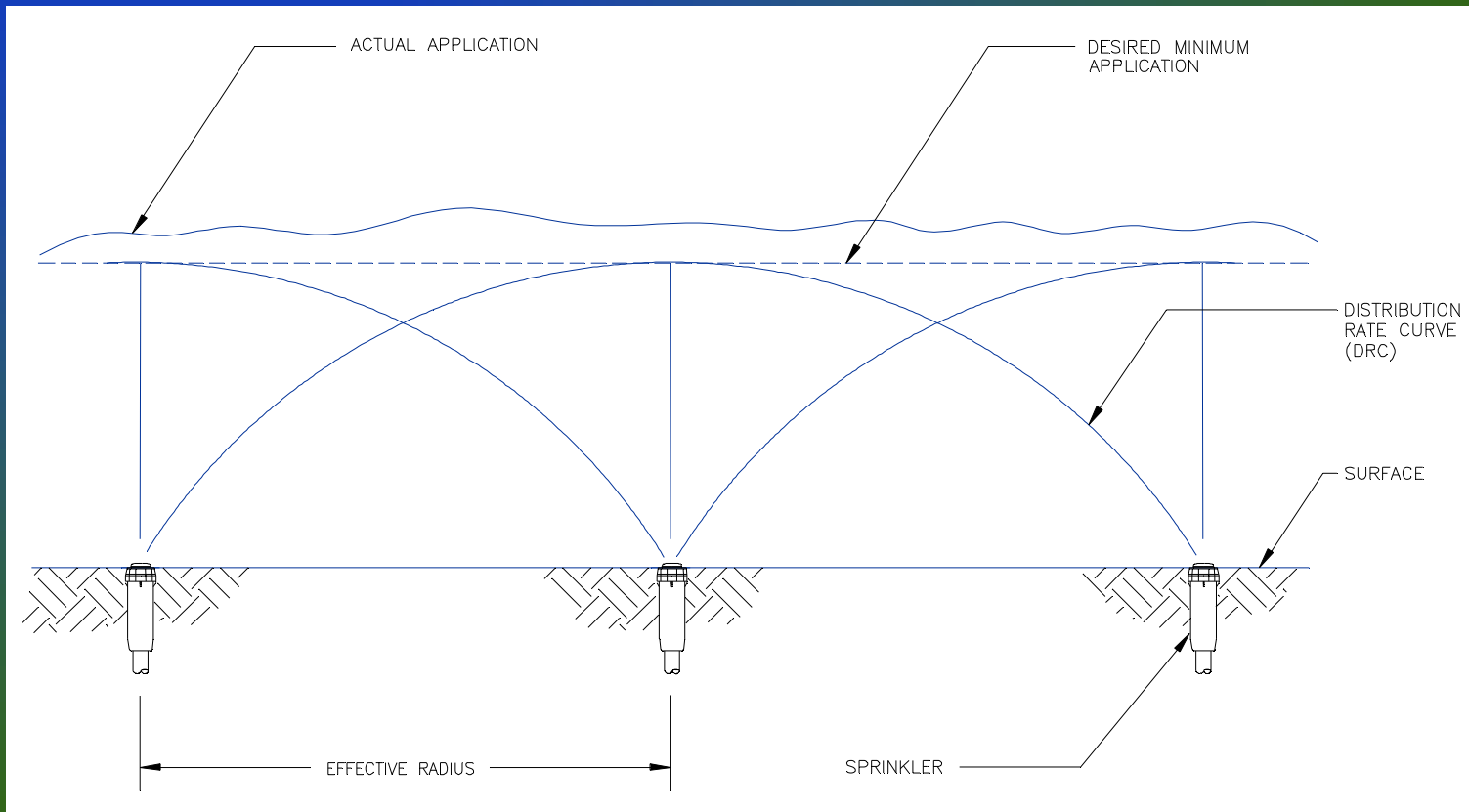
- Hydrozones
- Head-head spacing
- Drip emitters for beds
- Pop-ups for turf
- No overspray



Example Design Source: Valerian, llc and Engle Homes 2003

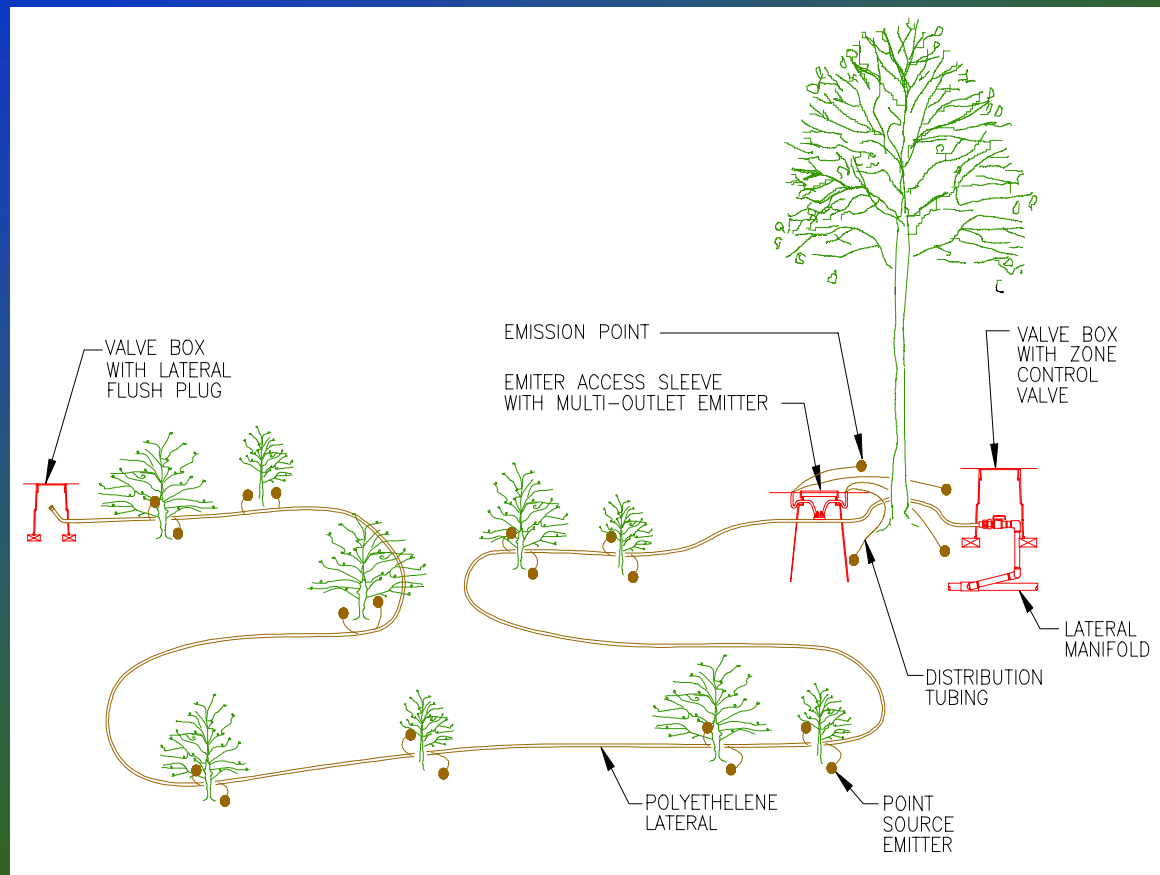
Irrigation System Design

Proper head spacing/configuration and operating pressures are critical for uniform water distribution.



Graphic Source: Stephen Smith, Aqua Engineering.

Drip Irrigation for Trees/Shrubs



Graphic Source: Stephen Smith, Aqua Engineering.

Irrigation System Installation/Retrofitting

- Properly install equipment
- Install according to design specs.
- Install water conserving equipment
- Ensure owner knows how to operate



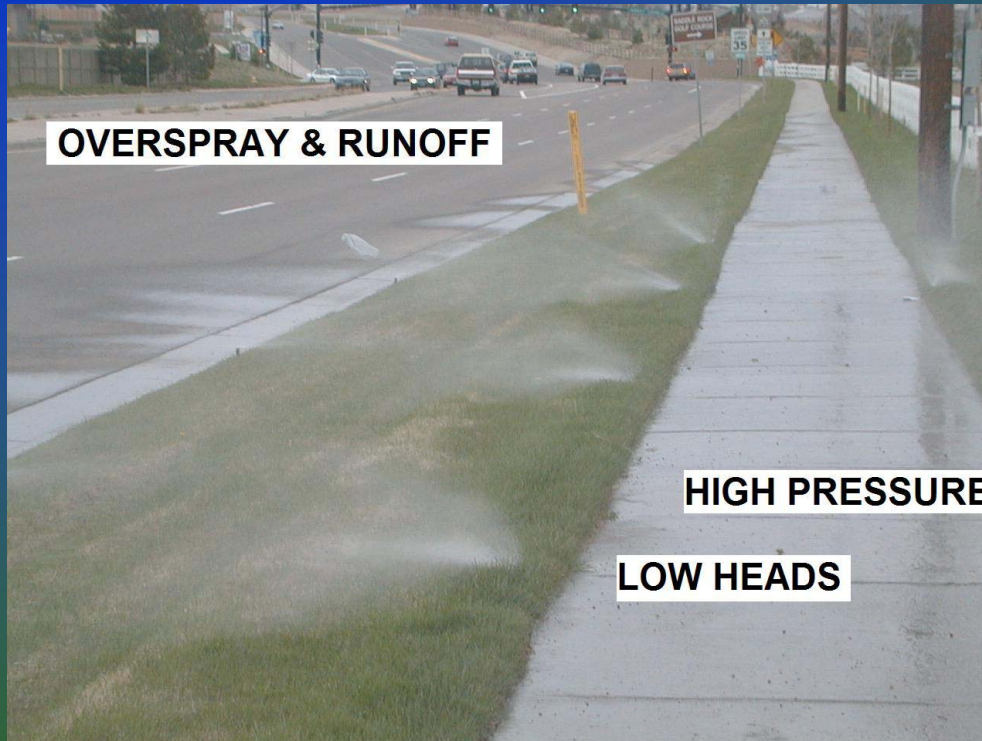
Soil Moisture Sensors



ET Controller

Graphic Sources: 1) Northern Colorado Water Conservancy District; 2) Aquacraft, WeatherTRAK

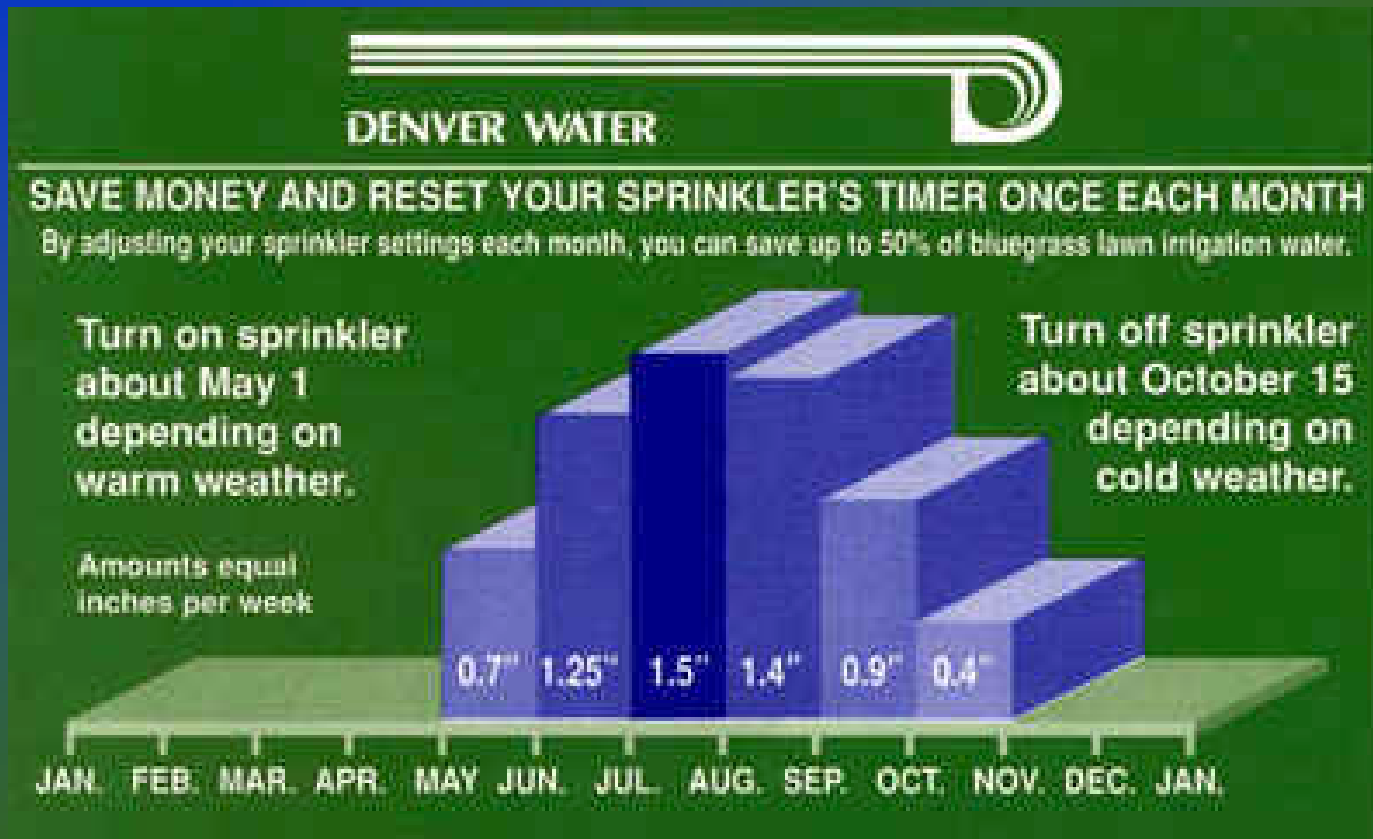
Irrigation Maintenance



- Check, adjust and repair irrigation equipment
- Shut off when damaged
- Reset automatic controllers to meet plant needs

Copyright 2004, Keesen Water Management. Permission granted.

Regularly Adjust Irrigation System



Source: Denver Water, http://www.denverwater.org/cons_xeriscape/cons_xeriscapeframe.html

Mulching

(Xeriscape Principle 6)

- Reduces water loss
- Reduces soil loss
- Suppresses weeds
- Promotes uniform temperature
- Promotes soil micro-organism activity
- Aesthetic amenity



Photo Source: Denver Water

Appropriate Landscape Maintenance

“There’s More to It than Just Water”

(Xeriscape Principle 7)

- Check, adjust and repair irrigation system
- Develop/Follow Site Water Budget
- Reset irrigation controller
- Aerate turf
- Replenish mulch
- Apply fertilizer, as needed
- Properly prune
- Pesticide/herbicide as needed, following label
- Mow at proper height
- Maintain equipment
- Monitor & keep records

Additional BMP Topics



- Herbaceous and Woody Plant Care
- Turf Management
- Mowing, Lawn Waste Disposal & Composting
- Fertilizer, Pesticide and Herbicide Application, Handling & Disposal
- IPM/PHC
- Material Safety Data Sheets (MSDS)
- Role of Landscaping in Engineered Drainageways
- Riparian Buffer Zone Preservation
- Parks, Golf Courses and Other Large Landscapes

Regulatory Awareness and Compliance

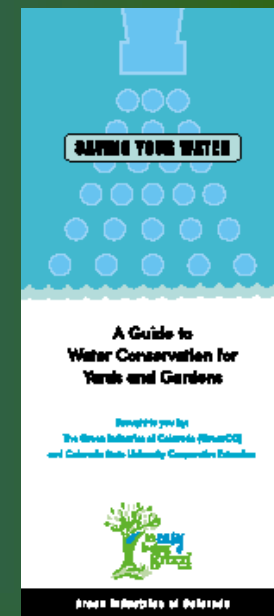
- Pesticides
- Riparian (streamside) setbacks
- Wetlands
- Stormwater management
- Erosion/sediment control
- Groundwater
- Noxious Weeds
- Water rights
- Landscape ordinances
- Back-flow prevention
- Cross-connection controls
- Fire
- Wildlife
- Utilities

Appendices of GreenCO BMP Manual

- Erosion and Sediment Control BMPs
- Permanent Stormwater BMPs
- Regulatory Matrix
- Water Budget Calculator (also on website)

Educate the Public!

- You set the example!
- GreenCO website brochures
- Educate public on topics such as:
 - Irrigation system maintenance
 - Appropriate turf water use
 - Pesticide/fertilizer application
 - Ground preparation
 - Xeriscape
 - Water budgeting



Education of Employees

- Provide educational materials (field use, bilingual)
- Maintain professional credentials
- Make water conservation a priority
- Emphasize following labels
- Require compliance with relevant permits, local ordinances and regulations

Certification Programs to Consider

- Associated Landscape Contractors of CO
 - Certified Landscape Technician (CLT)
 - Certified Irrigation Technician (CIT)
 - Certified Landscape Professional (CLP)
- Colorado Nursery Association: CO. Certified Nursery Professional
- Colorado Greenhouse Growers Association: Certified Greenhouse Professional
- International Society of Arboriculture: Certified Arborist
- Irrigation Association: Certified Irrigation Auditor (among others)
- Colorado Department of Agriculture: Licensed Commercial Pesticide Applicator
- Green School Certificate
- Professional Gardener

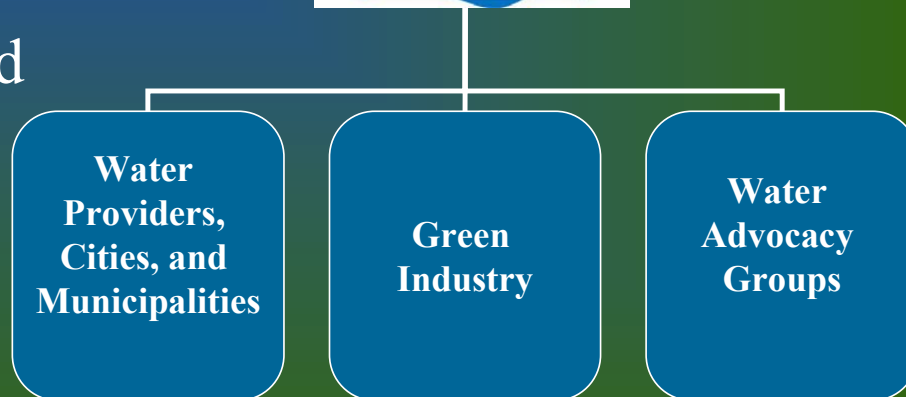
GreenCO BMP Training Course

- Offered in English and Spanish
- 1½ hour BMP overview
- Class based on GreenCO BMP Manual
- Test on manual (100 questions, open book with 2-hour time limit, 75% passing score)
- Certificate of completion – “Seal of Knowledge”
- Recognition on GreenCO website with links to municipalities and others



Colorado WaterWise Council (CWWC)

- The “Voice” of the Colorado’s water efficiency community
- Shares information, technical resources, and water management strategies.



Town of Castle Rock

“Creating a community culture that embraces water conservation and smart landscaping techniques, saving the Town and ratepayers millions of dollars in infrastructure, stabilizing rates, protecting property investments, and extending the life of the Town’s aquifers.”

Be Water Wise



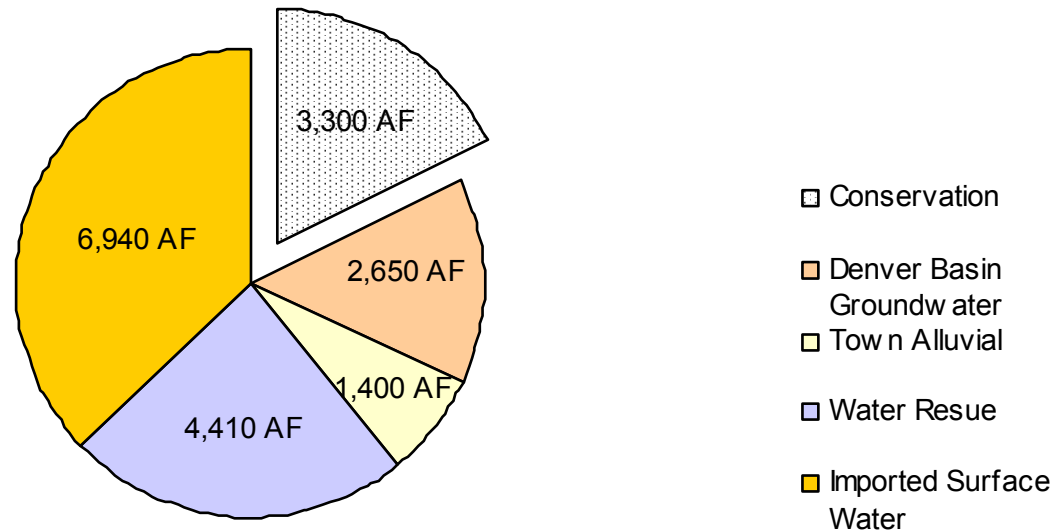
Town of Castle Rock

- Long Term Water Program Over View
 - Achieve a 75% renewable water program
 - Implement a proactive Water Conservation Program
 - Capital Program
 - Program Cost - \$400 million



Capital Program Overview

Distribution of 2055 Water Supply



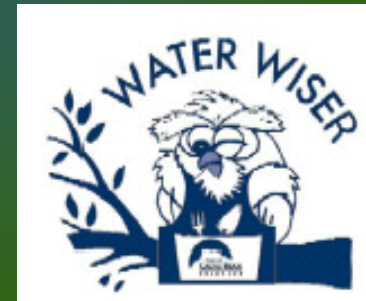
Conservation Program Overview

- Reduce average water consumption by 18%
 - 165 to 135 gallons per capita per day
 - For a single family resident the equates to:
 - 117 to 102 gallons per day
 - Summer months – 17,000 to 14,000 gallons per day
 - Winter months – 5,000 to 4,000 gallons per month
- Preserve/enhance Castle Rock landscape architecture
- Water rates for promoting conservation



Conservation Program Overview

- Landscape Professionals Registration
- Rebate Program
- Water Conservation Seminars



Landscape Professionals Registration

- In order to facilitate expeditious plan review, permitting and inspections of landscaping and irrigation systems
 - Landscape designers
 - Irrigation designers
 - Installation and Maintenance Professionals
- Registration is by *individual* not by company
- Must be registered to work within the Town of Castle Rock



Landscape Professionals Class

- Attend an annual seminar
- Participate in and pass a test on the Water Use Management Plan and the Town of Castle Rock Landscape Regulations and Principles



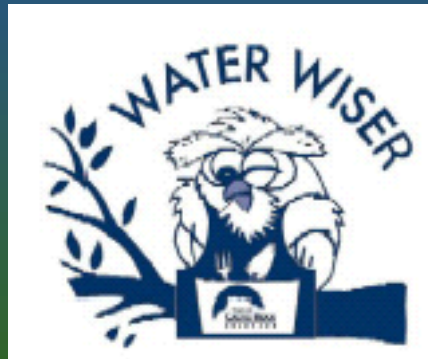
Landscape Professionals Class

- The seminar curriculum includes at a minimum:
 - Program intent and objectives
 - Designation of large irrigated areas
 - Large irrigated schedule parameters
 - Acquire submittal requirements
 - Enforcement parameters
 - Demand management tools and
 - Related Landscape Regulation and Principles components



Landscape Professionals Class

- Nine classes held in 2006
- 300 Registered Landscape Professionals
- Incorporated GreenCO BMP Training and Certificate Program



www.crgov.com

Partners in Education

- In late 2005, GreenCO pitches a BMP Training Roadshow to CWWC.
- Cities' support and host training sessions in 2005/06
- Town of Castle Rock takes the BMP Training Program to another level:
 - The City adopts GreenCO's BMPs
 - *Mandates* that before performing work in the town, you *must* be registered with the City, attend BMP training and pass the exam.

The Town of Castle Rock is the BMP Implementation Pioneer!

Brenda O'Brien, GreenCO

Accomplishments

- 420+ “Seal of Knowledge” recipients to date
 - field professionals from green industry businesses, municipalities, metro districts, utilities, parks, towns, schools, correctional facilities, churches, hospitals, and home builders have attended.
- Delivered annually at ProGreen EXPO (www.progreenexpo.com)
- Nine sessions held in 2006
- Partnered with CWWC members to sponsor sessions
- GreenCO BMPs incorporated into various city landscape ordinances and Metro Mayors Caucus outdoor BMPs
- BMP certificate required to work in the Town of Castle Rock

[View recipients at www.greenco.org](http://www.greenco.org)

BMP Testimonials

“Water Conservation in Colorado must become a way of life, all the time, not just in times of drought.”

- **Green Industries of Colorado (GreenCO) Board of Directors**

“We developed short-term and long-term BMP improvements such as, replacing worn heads, using proper pressure, fixing leaks, and hydrozoning for our nursery. When we save on water, we pass the savings on to our customers.”

- **John Pinder, Little Valley Wholesale Nursery, Brighton, Colorado**

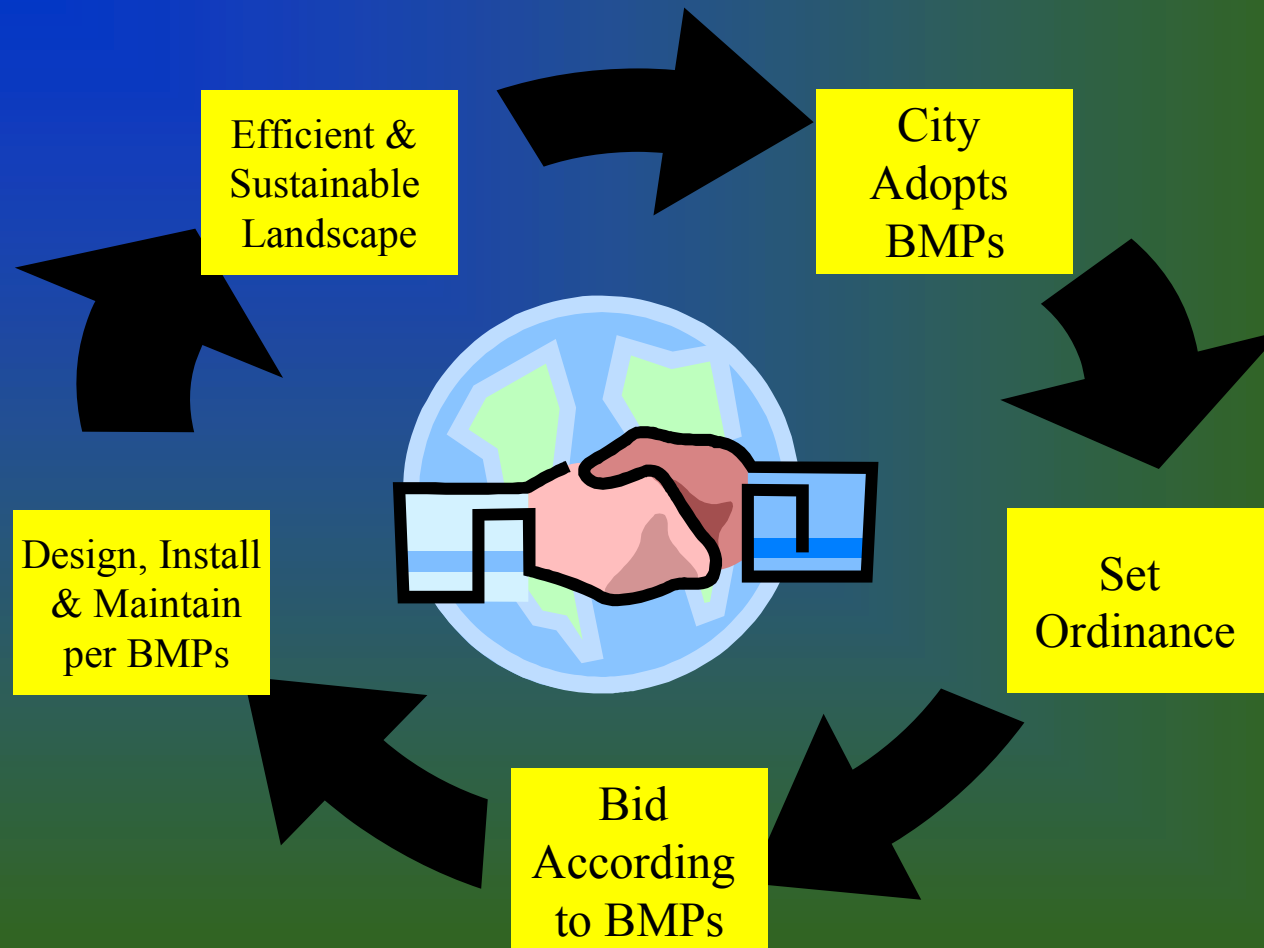
“The cities’ intent in reaching out to GreenCO is to establish the BMPs as the standard for built landscapes in their communities.”

- **Stu Feinglas, City of Westminster, Colorado**

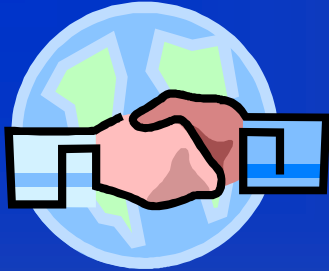
“The BMPs are a powerful instrument for the industry to follow. The manual puts all the information under one umbrella and keeps us on the same page.”

- **Todd Williams, American Civil Constructors, Littleton, Colorado**

BMPs Make Their Way Into Ordinances



BMPs are setting the standard for built landscapes in Colorado.



Is Your Green Industry Working with Water Suppliers' on Conservation Programs?

As the most visible user of outdoor water, the goal is to:

- Partner with local organizations to develop outdoor water conservation plans.
- Utilize BMPs in conservation planning/ordinances.
- Provide industry-driven leadership to help address water issues.
- Proactively identify solutions to landscape water waste and pollution.
- Supply expertise on green industry related matters.
- Act as a resource for scientific research.



Questions?

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