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**A LOOK INTO WATER CONSERVATION:
AN EVALUATION OF LANDSCAPE
WATER REGULATIONS**

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Water Conservation

Conservation Programs

- Price and Non-Price Programs

Landscape Water Conservation

- Common target for both price and non-price conservation programs
- Over 50% of municipal water deliveries are used for landscape irrigation in Colorado
- A savings of 30% can be achieved by utilizing proven design, installation and maintenance practices



Study Development

Effectiveness

- Current codes and policies

Developing Future Methodology

- Framework for future evaluations
- Application to various environments and regulations
- A tool for future water savings

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A LOOK INTO WATER CONSERVATION



Ongoing Question

Are landscape regulations functioning as effective tools for water conservation in landscape common areas?

Research Context

Case study based in Colorado Springs, CO that evaluated the effectiveness of three differing landscape regulations.

Landscape regulations, in three Colorado Springs developments, evaluated within four categories:

- **Regulation - Strength**
- **Design - Compliance**
- **Installation/Maintenance - Compliance**
- **Water Use - Effectiveness**

Intent

- **Provide** a viable framework to evaluate the effectiveness of water regulations as conservation tools.
- **Identify** the strength and weaknesses of the landscape regulations in terms of design, landscape installation, and landscape maintenance.
- **Create** a useful tool for continued stewardship of the land.

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Case Study Methodology

Regulation Selection

- Colorado Springs, Colorado
- La Plata Communities: Briargate Development
- 1998 regulation change
- 2003 change in philosophy and development regulations

Case Study Site Selection

- Landscape tract (landscaped right of ways, medians, and entry gardens)
- Controlled variables
- Classified plant communities

Data & Document Collection

- Landscape and irrigation plans
- Codes, policies, and covenants
- Historical wateruse data



Briargate MASTER PLAN



Introduction

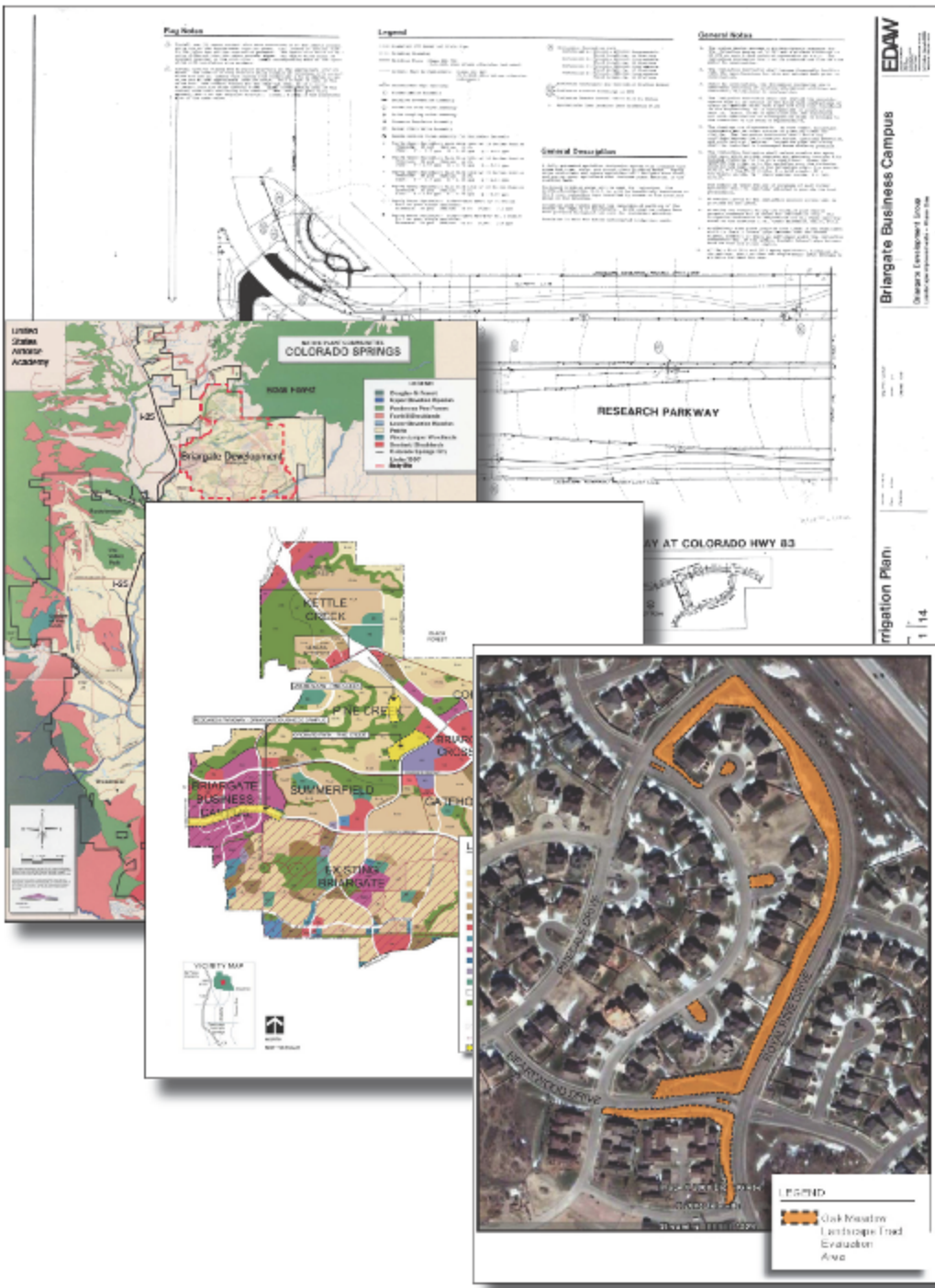
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Case Study Methodology

Document Collection

- Availability of Information

Site Establishment

- Identify regulation boundaries
- Irrigation meter location and coverage
- Selection of landscape tracts
- Identify square footage

Data Collection

- Availability of data
- Organization

Selected Regulations and Sites

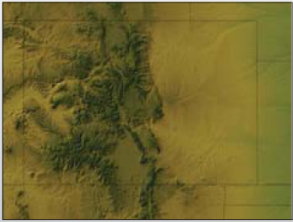
- **Briargate Business Campus**
 City Landscape Regulations and Development Guidelines **before 1998**
- **Pine Creek Community**
 City Landscape Regulations **after 1998**
- **Cordera Community**
 City Landscape Regulations **after 1998 + Community Guidelines**

A LOOK INTO WATER CONSERVATION

SITE SELECTION

For the thesis research, a case study in Colorado Springs, Colorado was developed. The case study concentrated on the **evaluation of landscape regulations and representative landscape tracts within three master planned communities.**

A single developer, La Plata Communities, was used in the study to help control the number of variables that could contribute to landscape water use in the landscape tracts and to expedite the document collection portion of the study.

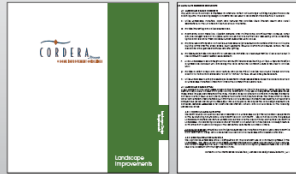


REGULATION EVALUATION

The first evaluation of the study measured the **strength of selected regulations using Xeriscape principles as the tool of measure.** The evaluation was based on a scoring system which awarded points to regulations based on two factors.

The first factor was the use of Xeriscape principles as a tool for conservation. One point was awarded for every Xeriscape principle cited in the text of the regulation. The citations can be either recommendations or requirements that encourage the use of Xeriscape principles when designing, installing, and maintaining landscape tracts.

The second factor in the evaluation is the enforcement of the Xeriscape principles cited within the landscape regulations. Enforcement of the principle could be carried out through an approval or inspection process.



REGULATION STRENGTHS AND WEAKNESSES

Breakdown of regulation strength and weaknesses into xeriscape categories.

Observations of regulation application in designed and built landscape.

DESIGN EVALUATION

The second evaluation in the study measured the **level of regulation compliance expressed in the landscapes design.** The level of regulation compliance was based on an evaluation of landscape documents, interviews and on-site observations.

INSTALLATION/MAINTENANCE EVALUATION

The third evaluation in the study measured the **level of regulation compliance expressed in the built and maintained landscape.** The level of regulation compliance was based on an evaluation of landscape documents, interviews and on-site observations.



LANDSCAPE STRENGTHS AND WEAKNESSES

Record of landscape tract field observations and design critique.

Analysis of overall scoring in Design and Installation/Maintenance categories.

WATER USE EVALUATION

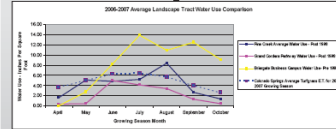
The fourth evaluation compared the **individual landscape tracts to one another and to the water use of a traditional landscape.** The first three categories established the effectiveness of regulations as tools for producing water conserving landscapes. The third category evaluated if the landscape tracts that were designed and built in compliance to the Xeriscape landscape regulations were actually conserving water.



ANALYSIS AND RESULTS

After determining the water use for a given landscape tract in the fourth category of evaluation the results from the first three categories were analyzed to **determine why there was or why there wasn't water savings.** This assessment will be the basis for the studies recommendations.

Preliminary results confirm that landscapes developed under the more restrictive landscape regulations are both xeric in nature and water conserving. The study confirms that xeric landscape tracts in housing developments resulted from progressive landscape regulations implemented by the city and community boards.

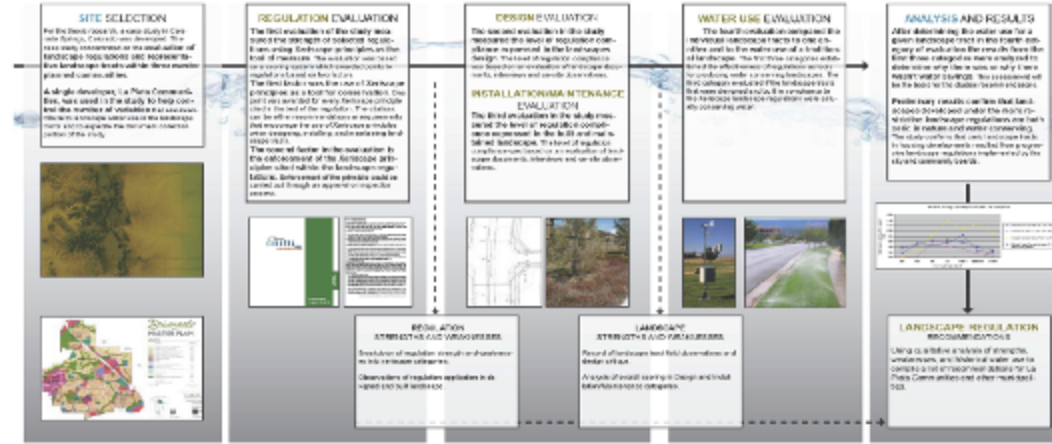


LANDSCAPE REGULATION RECOMMENDATIONS

Using qualitative analysis of strengths, weaknesses, and historical water use to compile a list of recommendations for La Plata Communities and other municipalities.

Case Study Methodology

A LOOK INTO WATER CONSERVATION



Evaluation

- **Four Categories of Evaluation** Each category representing one of the four steps necessary for the development and maintenance of water efficient landscapes:

1. Regulations
2. Design
3. Installation/Maintenance
4. Water Use

Scoring Analysis

- Scoring system based on of the proven methods of Xeriscape. Nine resulting categories:

1. Planning and Design
2. Group Plants Accordingly/Hydro-zoning
3. Appropriate Plant Selection
4. Limit Turf Areas to Those Needed for Practical Uses
5. Use Efficient Irrigation Systems
6. Schedule Irrigation Wisely
7. Soil Analysis and Improvement
8. Use of Mulch
9. Provide Regular Maintenance

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Landscape Tract Regulations	Water-Wise Landscaping Categories																		Total Score												
	Planning and Design			Group Plants Accordingly/Hydro-zoning			Appropriate Plant Selection			Limit Turf Areas to Those Needed for Practical Uses			Use of Efficient Irrigation Systems			Schedule Irrigation Wisely				Soil Analysis and Improvement			Use of Mulch			Provide Regular Maintenance					
	C	B	I	C	B	I	C	B	I	C	B	I	C	B	I	C	B	I		C	B	I	C	B	I	C	B	I			
Prine Creek City Regulations After 1990	2	1	1	1	1	1	2	1	0	2	0	0	1	1	2	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	30
Corvallis City Regulations After 1995 + Development Regulations	5	2	1	1	1	1	2	1	0	2	0	0	2	1	2	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	56
Binnigale Business Campus City Regulations Before 1995	1	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4

Strength of regulation scoring:
 1 point for effective (E)
 1 point for negative regulation (N)
 1 point for negative regulation (N)

Cordera Regulation Evaluation

Planning and Design

- Guideline 2.2

Plans and specifications showing the nature, kind, shape, color, size, materials and location of all proposed exterior structures and improvements (including landscaping) shall be submitted to the DRB or MC for review and approval PRIOR TO INSTALLATION. Incomplete or illegible submittals will be returned to the applicant without review. Except for the conversion of garages to living space, any interior of a residence may be modified without DRB or MC approval.

- Guideline 2.6

If and when submission of plans to the City, Pikes Peak Regional Building Authority or any other governmental agency is required, those plans must be reviewed and approved by the DRB first. Exceptions to this must be granted in writing from the DRB.

- Code Section 309 C

Provide inspection affidavit by qualified designer.

- Code Section 311 B

The landscape plan shall present a site-adapted design with regard to soil type, microclimate, vegetative cover, efficient water use, grouping of signature plants.

- Policy 311 G

Develop a plan that takes into account both the regional climate and the microclimate of the site, existing vegetation and topography, the proposed use of the property, and grouping plants.

- Code Section 312 A

The required landscape plan shall be prepared by a person who meets the qualifications established in the professional qualifications standards of the landscape policy manual.

- Policy 312 1

Professional qualifications needed to prepare required plans. Qualifications shall be certified and submitted with the plan on Appendix 1.

- Code Section 313 C

The landscape grading plan shall be consistent with the landscape and irrigation plans and shall ensure: the provision of adequate and proper drainage for survival of plant material, the stockpiling and redistribution of beneficial topsoil, the mitigation of slopes that are difficult to vegetate or irrigate, or would result in water runoff onto paved surfaces.

Group Plants Accordingly / Hydrozoning

- Policy 311 I

Develop a Schematic Landscape Diagram of the site that shows the general location and type of each plant community and hydrozone to be used. The diagram must be submitted.

- Code Section 312 E

Plants with similar water needs within each site microclimate shall be zoned or grouped together for efficiency of water application, to prevent water waste and to provide optimum application of water to the plants.

Case Study Methodology

Regulation

- Analysis of the three selected landscape regulations:
 - Pine Creek - After 1998
 - Cordera - After 1998 + Development Regulations
 - Briargate Business Campus - Before 1998
- Simple one point scoring system to identify strengths and weaknesses in regulations based on:

Citations

Submittals

Inspections

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Landscape Tract Regulations	Water-Wise Landscaping Categories																											
	Planning and Design			Group Plants Accordingly/ Hydrozoning			Appropriate Plant Selection			Limit Turf Areas to Those Needed for Practical Uses			Use of Efficient Irrigation Systems			Schedule Irrigation Wisely			Soil Analyses and Improvement			Use of Mulch			Provide Regular Maintenance			Total Score
	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	
Pine Creek City Regulations After 1998	3	1	1	1	1	1	2	1	0	2	0	0	1	1	2	2	0	0	3	2	0	2	0	0	2	0	1	29
Cordera City Regulations After 1998 + Development Regulations	5	2	1	1	1	1	2	1	0	2	0	0	4	1	2	2	0	0	4	2	0	2	0	0	2	0	1	36
Briargate Business Campus City Regulations Before 1998	1	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Strength of Regulation Scoring

1 point for citation (C)

1 point for required submittal (S)









1 point for required inspection (I)

Cordera Grand Cordera		Landscape On Site Evaluation Sheet	
Landscape Evaluation Categories	Observations	Photo #'s	Score
1 Planning and Design			
The landscape represents a site adapted design with regard to soil type, microclimate, vegetative cover, efficient water use, grouping of plants.	Landscape uses a blend of native turf, drought tolerant plants, and turf grass. Landscapes installed according to plan.	Cordera 1.1, 1.2	1
Mitigation of slopes that are difficult to vegetate or irrigate, or would result in water runoff onto paved surfaces.	No slopes that exceed maximum standard.		1
2 Group Plants Accordingly / Hydrozoning			
Plants with similar water needs within each site micro-climate are zoned or grouped together.	Plants grouped according to approved designs. Approved designs group Plants effectively into hydrozones.	Cordera 2.1, 2.2	1
3 Appropriate Plant Selection			

Case Study Methodology

Landscape Evaluation: Design, Installation, Maintenance

- Measure of regulation compliance through document review, correspondence, and on site evaluations
- Simple scoring system based on 0 points for non-compliance and 1 point for compliance
- Evaluation sheets used to record field observations and correspondence
- Identify strengths and weaknesses

Cordera Grand Cordera On-Site Evaluation	
<p>Xeriscape vs. Native Plant Communities</p>  <p>1.1</p>  <p>1.2</p>	
<p>Plant Groupings</p>  <p>2.1</p>  <p>2.2</p>	
<p>Impractical Turf Areas</p>  <p>4.1</p>  <p>4.2</p>	
<p>Inefficient Turf Configurations</p>  <p>4.3</p>  <p>4.4</p>	

Landscape Design Evaluation	Water-Wise Landscape Categories										
	Planning and Design	Group plants accordingly/ Hydrozoning	Appropriate	Limit Turf Areas to	Use of Efficient	Schedule	Soil Analyses	Use of	Provide	Total	
La Plata Properties											
Pine Creek City Regulations after 1998	1*										
Cordera City Regulations after 1998 + Development Guidelines	1*										
Briargate Business Campus City Regulations before 1998	1*										
1 = Regulation compliance 0 = Non-compliance											

Landscape Design Evaluation	Water-Wise Landscape Categories										
	Planning and Design	Group plants accordingly/ Hydrozoning	Appropriate Plant Selection	Limit Turf Areas to Those Needed for Practical Uses	Use of Efficient Irrigation Systems	Schedule Irrigation Wisely	Soil Analyses and Improvement	Use of Mulch	Provide Regular Maintenance	Total Score	
La Plata Properties											
Pine Creek City Regulations after 1998											
Cordera City Regulations after 1998 + Development Guidelines	1*	1	1	1*	1*	1*	1	1	1	9	
Briargate Business Campus City Regulations before 1998	1*	1	1	1*	1*	1*	1	1	1	9	
1 = Regulation compliance 0 = Non-compliance											

Sliding Scale With Level of Application 0-9 (9 being the strongest relationship between regulation and designed landscape)

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Cordera Grand Cordera		Landscape On Site Evaluation Sheet		
Landscape Evaluation Categories	Observations	Photo #'s	Score	
1 Planning and Design				
The landscape represents a site adapted design with regard to soil type, microclimate, vegetative cover, efficient water use, grouping of plants.	Landscape uses a blend of native turf, drought tolerant plants, and turf grass. Landscapes installed according to plan.	Cordera 1.1, 1.2	1	
Mitigation of slopes that are difficult to vegetate or irrigate, or would result in water runoff onto paved surfaces.	No slopes that exceed maximum standard.		1	
2 Group Plants Accordingly / Hydrozoning				
Plants with similar water needs within each site micro-climate are zoned or grouped together.	Plants grouped according to approved designs. Approved designs group Plants effectively into hydrozones.	Cordera 2.1, 2.2	1	
3 Appropriate Plant Selection				
Landscape reflects the ecological context of the site using diverse plant species that are indicative of local plant communities. Based on the Landscape Code and Policy Manuals Prairie Region Plant Community.	Native plant communities are represented in some of the plant material, but the overall planting scheme is not indicative of surroundings.		1	
Develop a project plant list from 1998 Landscape Code and Policy Manual to satisfy site category requirements. At least 60% of the trees and 60% of the shrubs must be signature plants for the chosen plant communities.	Designed and installed according to regulations.		1	
4 Limit Turf Areas to Those Needed for Practical Uses				
High water use turf is limited to high traffic or recreational areas, drainage swales or other appropriate uses.	High water use turf was limited to entry ways and used as a design element within the landscape to balance native turfs. Turf not always limited to practical areas.	Cordera 4.1, 4.2	1	
No more than 50% of the entire site is covered in high water use turf.			1	
Turf is limited to slopes less than 6:1.			1	
Turf is limited to medians greater than 12' in width.			1	
Turf is prohibited in configurations that cannot be efficiently irrigated.	Opportunities for improvement but the majority of turf areas can be irrigated efficiently.	Cordera 4.3, 4.4	1	
Turf is prohibited in motor vehicle lot planters that are less than 8' in width.			1	
Limited amounts of turf in street right-of-ways where the distance between the curb and detached sidewalk is less than 8'.			1	
5 Use of Efficient Irrigation Systems				
Method of irrigation matched to size and shape of area and plant material, and for uniformity coverage.	All shrub beds on drip irrigation.		1	
Use of rain sensors on all system controllers.	Irrigation controllers all utilize rain sensors.		1	
6 Schedule Irrigation Wisely				
Established irrigation schedules.	Schedules established on landscape designs and adjusted in the field. Native turf areas are on scheduled irrigation in April and May.		1	
7 Soil Analysis and Improvement				
Turf grass soil amended appropriately.			1	
Soil analyzed and amended appropriately.	Soil was inspected and amended according to Code Section 315.		1	
8 Use of Mulch				
Apply and maintain organic mulches at appropriate depths in planting beds to assist soils in retaining water, reduce weed growth, and prevent erosion.	Mulches applied only when requested by community home owners association. Mulch depth was sufficient upon evaluation.		1	
9 Provide Regular Maintenance				
Pruning	Plant material was well maintained and pruned.		1	
Weeding	Weeding done on a weekly basis with pre-emergent being used routinely.		1	
Mulching	Mulch only when needed. New mulch was laid down in 2007. Mulch depth was good overall.		1	
Irrigation system maintenance	System checks four days a week according to landscape manager.		1	



Cordera Grand Cordera On-Site Evaluation

Xeriscape vs. Native Plant Communities

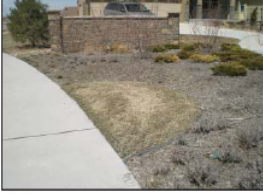
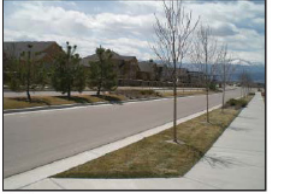
1.11.2

Plant Groupings



2.12.2

Impactical Turf Areas

4.14.2

Inefficient Turf Configurations

4.34.4

Landscape Design Evaluation	Water-Wise Landscape Categories									
La Plata Properties	Planning and Design	Group plants accordingly/ Hydrozoning	Appropriate Plant Selection	Limit Turf Areas to Those Needed for Practical Uses	Use of Efficient Irrigation Systems	Schedule Irrigation Wisely	Soil Analyses and Improvement	Use of Mulch	Provide Regular Maintenance	Total Score
Pine Creek City Regulations after 1998	1*	1	1	1*	1*	1*	1	1	1	9
Cordera City Regulations after 1998 + Development Guidelines	1*	1	1	1*	1*	1*	1	1	1	9
Briargate Business Campus City Regulations before 1998	1*	1*	0	0	1*	0	0	1	1	5

1 = Regulation compliance

0 = Non-compliance

Sliding Scale With Level of Application 0-9 (9 being the strongest relationship between regulation and designed landscape)

* Indicates that category was met but could be improved upon - see evaluation forms for more information

Landscape Site Evaluation	Water-Wise Landscape Categories									
La Plata Properties	Planning and Design	Group plants accordingly/ Hydrozoning	Appropriate Plant Selection	Limit Turf Areas to Those Needed for Practical Uses	Use of Efficient Irrigation Systems	Schedule Irrigation Wisely	Soil Analyses and Improvement	Use of Mulch	Provide Regular Maintenance	Total Score
Pine Creek City Regulations after 1998	1*	1	1*	1*	1*	1*	0	1*	1	8
Cordera City Regulations after 1998 + Development Guidelines	1*	1	1*	1*	1*	1*	1	1	1	9
Briargate Business Campus City Regulations before 1998	0	1*	0	0	0	0	0	1	0	2

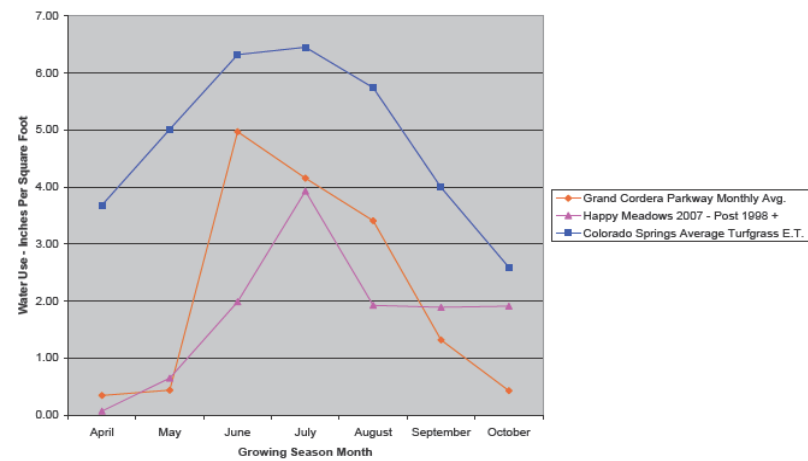
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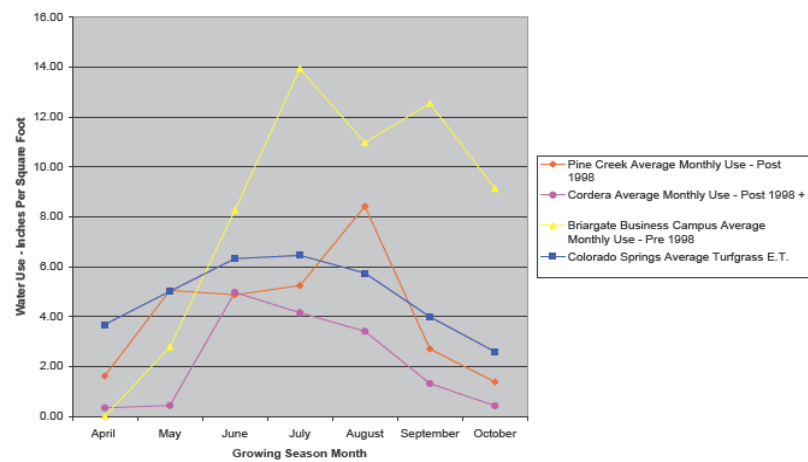
Sliding Scale With Level of Application 0-9 (9 being the strongest relationship between regulation and built landscape)

* Indicates that category was met but could be improved upon - see evaluation forms for more information

Cordera Water Use Comparison with Turfgrass E.T.
 2006 -2007 Averages



Regulation Water Use Comparison Chart
 2006-2007 Averages



Growing Season Month	Cordera Grand Cordera 2006	Cordera Grand Cordera 2007	Cordera Grand Cordera Monthly Avg.	2006 Colorado Springs E.T.	2007 Colorado Springs E.T.	Colorado Springs Average E.T. for 2006 - 2007 Growing Season
April	0.00	0.69	0.34	4.26	3.09	3.68
May	0.32	0.56	0.44	5.39	4.62	5.01
June	5.00	4.93	4.97	6.89	5.74	6.32
July	3.07	5.24	4.15	6.41	6.49	6.45
August	3.30	3.51	3.41	5.31	6.17	5.74
September	2.52	0.12	1.32	3.41	4.57	3.99
October	0.75	0.11	0.43	2.25	2.93	2.59
Total Water Use	14.95	15.15	15.05	33.92	33.61	33.77

* All Water Use Numbers Expressed in Inches Per Square Foot
 Red numbers indicate missing data that was estimated from previous years water use data

Case Study Methodology

Water Use

- Historical water use for 2006 and 2007 growing season
- Two comparisons
 1. Turfgrass E.T.
 2. Three regulations
- Excel charts and graphs
- Identify effectiveness in terms of water saved



Landscape Tract Regulations	Water-Wise Landscaping Categories																											
	Planning and Design			Group Plants Accordingly/ Hydrozoning			Appropriate Plant Selection			Limit Turf Areas to Those Needed for Practical Uses			Use of Efficient Irrigation Systems			Schedule Irrigation Wisely			Soil Analyses and Improvement			Use of Mulch			Provide Regular Maintenance			Total Score
	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	
Pine Creek City Regulations After 1998	3	1	1	1	1	1	2	1	0	2	0	0	1	1	2	2	0	0	3	2	0	2	0	0	2	0	1	29
Cordera City Regulations After 1998 + Development Regulations	5	2	1	1	1	1	2	1	0	2	0	0	4	1	2	2	0	0	4	2	0	2	0	0	2	0	1	36
Briargate Business Campus City Regulations Before 1998	1	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Strength of Regulation Scoring
1 point for citation (C)
1 point for required submittal (S)
1 point for required inspection (I)

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Results

Regulation

- The evaluation scores indicated that the post 1998 city regulations + development guidelines had the highest utilization of the water-wise categories (**36**) followed by:
 - City landscape regulations post 1998 (**29**)
 - City and development regulations pre 1998 (**6**)

Key Strengths

- Pine Creek and Cordera (post 1998) both had very strong scores in the Planning and Design, Soil Analysis and Improvement and Use of Efficient Irrigation System categories

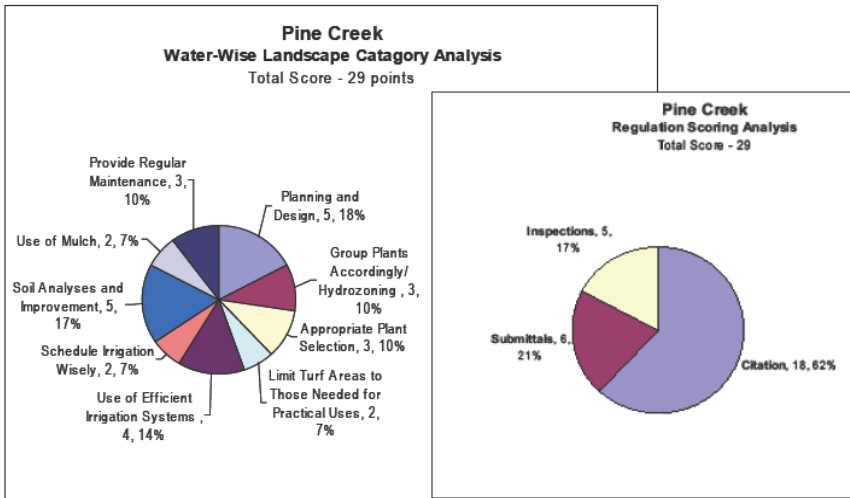
Key Weaknesses

- Briargate Business Campus (pre 1998) had a very low overall score
- All three regulations didn't require the submittal or inspection of irrigation schedules
- All three regulations didn't require an inspection of the soil amendment process during construction

Results

Key Strengths

- Pine Creek and Cordera (post 1998) both had very strong scores in the Planning and Design, Soil Analysis and Improvement and Use of Efficient Irrigation System categories
- Pine Creek and Cordera (post 1998) scored high in the submittal and inspection categories
- Pine Creek and Cordera (Post 1998) regulations showed a diversity in the written guidelines, codes, and policies
- Post 1998 regulations showed a significant number of codes and policies enforcing the written citations



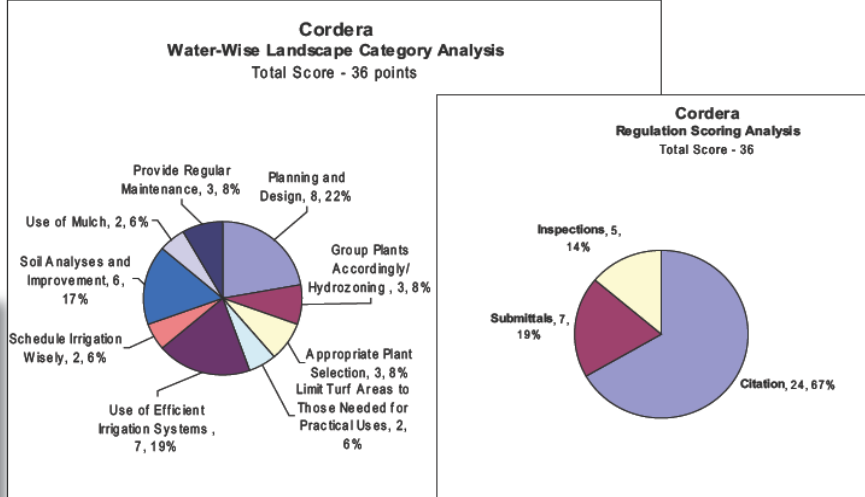
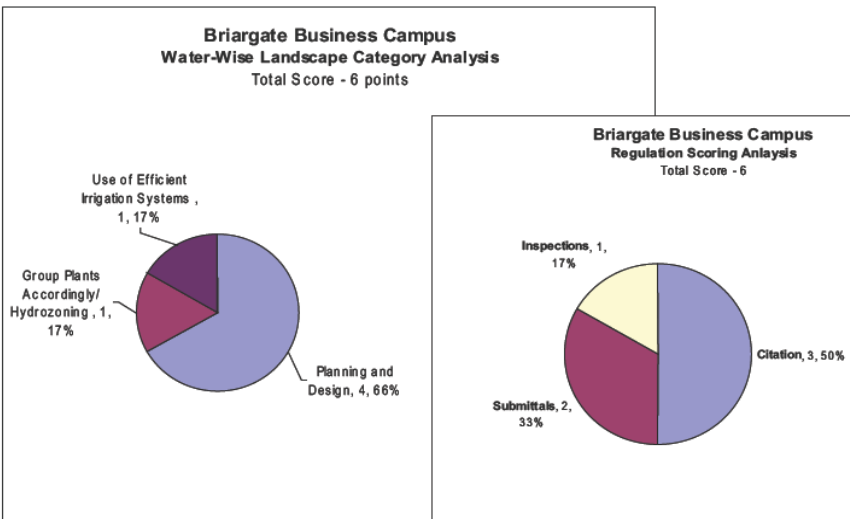
Landscape Tract Regulations	Water-Wise Landscaping Categories																		Total Score												
	Planning and Design			Group Plants Accordingly/Hydrozoning			Appropriate Plant Selection			Limit Turf Areas to Those Needed for Practical Uses			Use of Efficient Irrigation Systems			Schedule Irrigation Wisely				Soil Analyses and Improvement			Use of Mulch			Provide Regular Maintenance					
	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I	C	S	I		C	S	I	C	S	I	C	S	I			
Pine Creek City Regulations After 1998	3	1	1	1	1	1	2	1	0	2	0	0	1	1	2	2	0	0	3	2	0	2	0	0	2	0	0	2	0	1	29
Cordera City Regulations After 1998 + Development Regulations	5	2	1	1	1	1	2	1	0	2	0	0	4	1	2	2	0	0	4	2	0	2	0	0	2	0	0	2	0	1	36
Briargate Business Campus City Regulations Before 1998	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Strength of Regulation Scoring

1 point for citation (c)

1 point for required submittal (s)

1 point for required inspection (i)



Key Weaknesses

- Briargate Business Campus (pre 1998) had a very low overall score
- Low overall score in the schedule irrigation wisely categories

Results

Landscape Evaluation: Design

- Designs for all three regulations showed compliance

Landscape Design Evaluation	Water-Wise Landscape Categories									
La Plata Properties	Planning and Design	Group plants accordingly/ Hydrozoning	Appropriate Plant Selection	Limit Turf Areas to Those Needed for Practical Uses	Use of Efficient Irrigation Systems	Schedule Irrigation Wisely	Soil Analyses and Improvement	Use of Mulch	Provide Regular Maintenance	Total Score
Pine Creek City Regulations after 1998	1*	1	1	1*	1*	1*	1	1	1	9
Cordera City Regulations after 1998 + Development Guidelines	1*	1	1	1*	1*	1*	1	1	1	9
Briargate Business Campus City Regulations before 1998	1*	1*	0	0	1*	0	0	1	1	5

1 = Regulation compliance
0 = Non-compliance

Sliding Scale With Level of Application 0-9 (9 being the strongest relationship between regulation and designed landscape)

* Indicates that category was met but could be improved upon - see evaluation forms for more information

Landscape Evaluation: Installation, Maintenance

- **Pine Creek and Cordera** (Post 1998) regulations and guidelines showed compliance in all nine categories excluding the **soil analysis and improvement** category in the Pine Creek (city regulations post 1998) landscape tracts
- **Briargate Business Campus** (Pre 1998) regulations and guidelines indicated compliance in 2 of the 3 water-wise categories that were found in the regulations. Indicating a lack of enforcement in the regulations and guidelines in the irrigation category

Landscape Site Evaluation	Water-Wise Landscape Categories									
La Plata Properties	Planning and Design	Group plants accordingly/ Hydrozoning	Appropriate Plant Selection	Limit Turf Areas to Those Needed for Practical Uses	Use of Efficient Irrigation Systems	Schedule Irrigation Wisely	Soil Analyses and Improvement	Use of Mulch	Provide Regular Maintenance	Total Score
Pine Creek City Regulations after 1998	1*	1	1*	1*	1*	1*	0	1*	1	8
Cordera City Regulations after 1998 + Development Guidelines	1*	1	1*	1*	1*	1*	1	1	1	9
Briargate Business Campus City Regulations before 1998	0	1*	0	0	0	0	0	1	0	2

1 = Regulation compliance
0 = Non-compliance

Sliding Scale With Level of Application 0-9 (9 being the strongest relationship between regulation and built landscape)

* Indicates that category was met but could be improved upon - see evaluation forms for more information

Introduction

Intent

Methods

Results

Conclusions

Introduction

Intent

Methods

Results

Conclusions



Conclusions

Effectiveness

Evaluated landscape regulations and guidelines created after 1998 were effective tools for conserving water

Evaluated landscape regulations and guidelines created before 1998 were not effective tools for conserving water

Changes to the City Landscape Code and Policy Manual in 1998 had a significant impact on the effectiveness of landscape regulations

Major Factors Contributing To The Success Of Policies and Regulations

- Diversity of Water-Wise Categories
- Significant representation of both citations and enforcement in the landscape regulations and guidelines
- Xeriscape principles more effective when working as a system.
- Creation and enforcement of landscape management plans
- Wholistic approach to regulations. Design, Implementation, Maintenance.

Recommendations

- Diversity
- Balance
- Management regulation and enforcement
- **Pine Creek and Cordera are working examples**

CREDITS:

Landscape Trial Photos

http://www.ncwcd.org/ims/ims_turfandurban_demos.asp

Horsetooth Reservoir

<http://radio.weblogs.com/0101170/images/water/horsetoothreservoir.jpg>

Map of Colorado

Photographer; Cartesia

EDAW/AECOM

DHM Design

A SPECIAL THANK YOU.....

Water Returns

Briargate Communities

La Plata Investments



**A LOOK INTO WATER CONSERVATION:
AN EVALUATION OF LANDSCAPE
WATER REGULATIONS**

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