

ODE TO “RIPARIAN FLOODPLAINS” Protect & be protected

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Engineers, LLC

& the Colorado Riparian Association
6th Annual Sustaining Colorado Watersheds Conference
Avon, Colorado - October 5, 2011

RIPARIAN FLOODPLAINS

Protect & be Protected

- *What are we trying to protect?*
- *Flood losses = f (riparian area losses)*
- *Natural processes for riparian floodplains*
- *Diverse ecosystem services*
- *Anthropogenic impacts*
- *Protection serves ALL!*
 - *Good for plants and wildlife*
 - *Good for recreation enthusiasts*
 - *Good for communities*
 - *Good for business*



RIPARIAN FLOODPLAINS

Protect & be Protected

What are we trying to protect?



Riparian areas in the Western U.S. often provide the only visible green vegetation

They convey the contrast with the surrounding dry landscape of the arid west

“the green line” or “ribbons of green”

A photograph of a lush green riparian area. The foreground is filled with tall, vibrant green grasses and small yellow wildflowers. In the background, there are several trees with dense green foliage, creating a thick canopy. The overall scene is bright and natural, representing a healthy riparian ecosystem.

➤ ***What are we trying to protect?***

Riparian areas comprise less than one percent of the land area of most western states, yet up to 80 percent of all wildlife species in this region of the country are dependent upon riparian areas for at least part of their life cycles.

**Robert H. Wayland III, EPA
Congressional Testimony, June 26, 1997**

➤ *What are we trying to protect?*

The “riparian zone provides important habitat for wetland species and serves as a migratory corridor for waterfowl, shorebirds, mammals, and other animals.”

U. S. Geological Survey

“small proportion of the landscape...essential habitat for a variety of plants and animals”
U. S. Army Corps of Engineers



Technology News from the Ecosystem Management and Restoration Research Program

April 1998

Corridors and vegetated buffer zones— Guidelines for Corps of Engineers projects

by Richard A. Fischer and Chester O. Martin, U.S. Army Engineer Waterways Experiment Station

To effectively manage natural resources within watersheds, it is often necessary to establish vegetated buffer zones to protect aquatic systems from land-use activities that occur in uplands.

The majority of inland Corps of Engineers civil works projects are constructed along streams and rivers that have adjacent riparian corridors.

There is increasing interest in the value of riparian areas as corridors and buffer strips on Corps lands, especially as potential wildlife habitat. These landscape features typically comprise a very small proportion of the landscape, but they provide essential habitat for a variety of plants and animals.

Many riparian buffer zones and corridors on Corps lands are badly in need of restoration and management. However, Corps project managers currently have only limited information and few guidelines on design criteria.

This article describes work to develop technical guidelines for restoring and managing riparian buffer zones and corridors. The potential benefits—with regard to water quality and many important ecological functions—are significant.



Riparian buffer zones remove nonpoint source pollution from adjacent land-use practices, such as agriculture, and also provide critical wildlife habitat.

What are we trying to protect?

“Riparian communities in the Western U.S. are the most productive habitats in North America and provide irreplaceable wildlife habitat for breeding, wintering, and migration.”

Bureau of Land Management

“there is a universal benefit in preserving the natural and beneficial functions of floodplains”

Urban Drainage & Flood Control District



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Welcome

Bill DeGroot, UDFCD Floodplain Manager

Philosophy

Why preserve the natural and beneficial values of floodplains

Library Links Resources

Regulatory 404 permitting
Land Development Approvals
UDFCD maintenance eligibility

Good Examples Projects that exemplify holistic planning offer amenities for livable communities

Business Cases Projects illustrating social, economic, and environmental benefits

RIPARIAN FLOODPLAINS

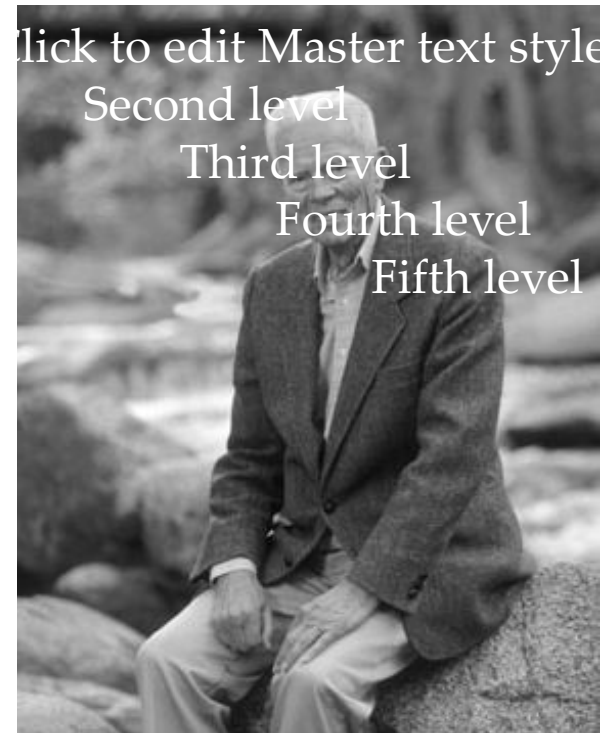
Protect & be Protected

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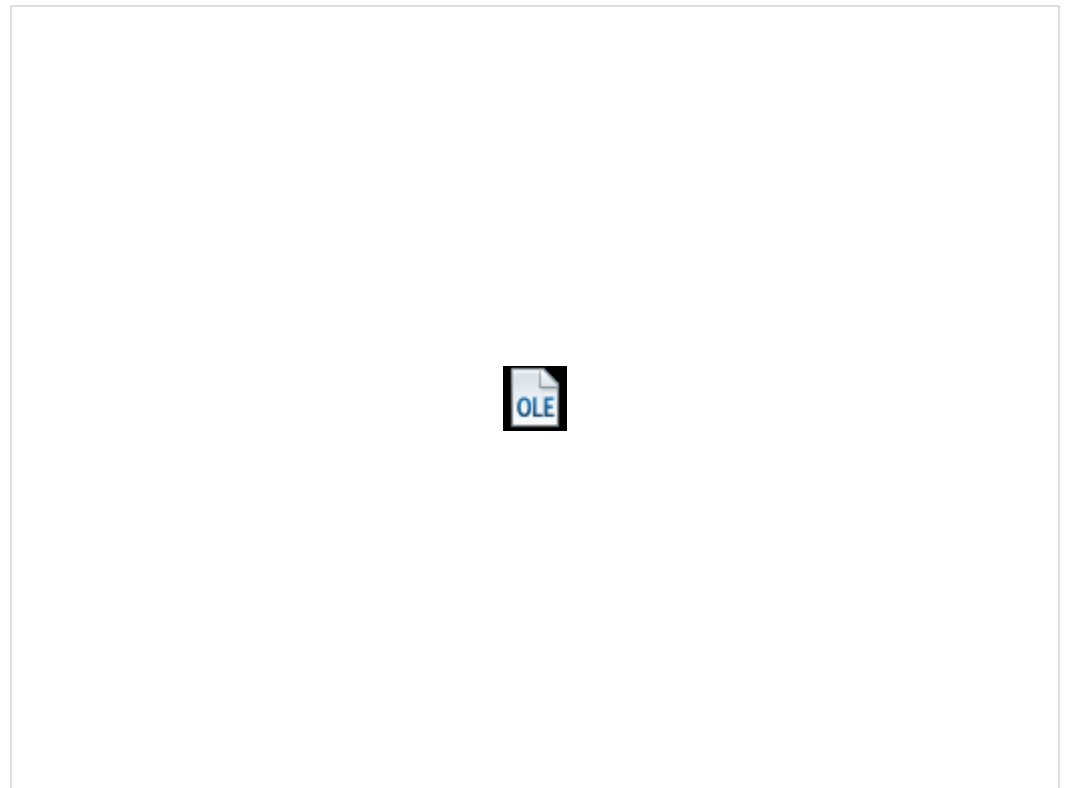
GILBERT WHITE TAUGHT US

*“Floods are Acts of Nature;
But Flood Losses are largely Acts of Man.”*

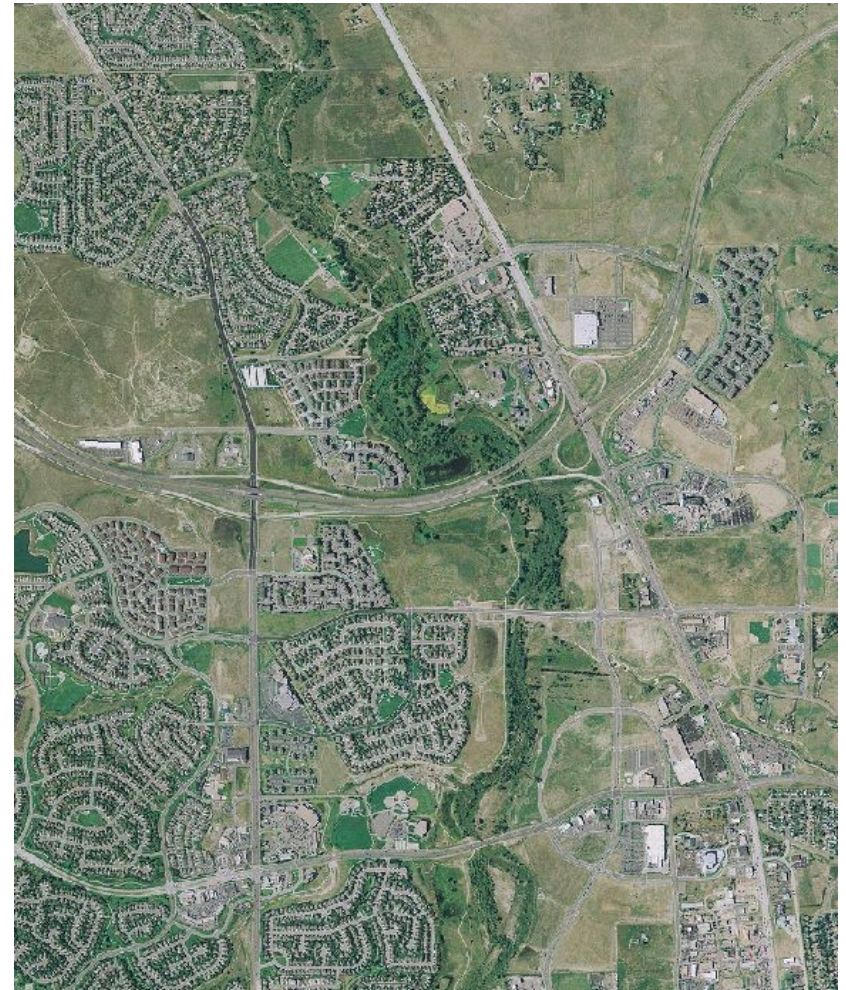
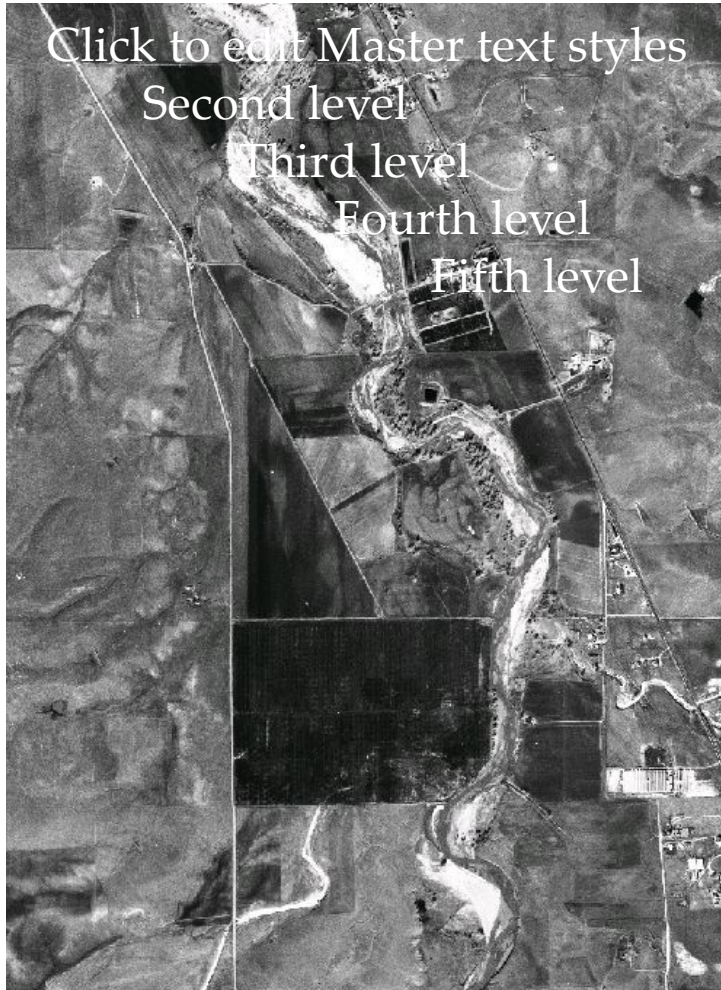


➤ *Flood losses = f (riparian area losses)*

At the same time we are losing riparian and wetland areas, flood losses are increasing across our nation at an alarming rate



Cherry Creek (Douglas County) Upstream from Arapahoe County



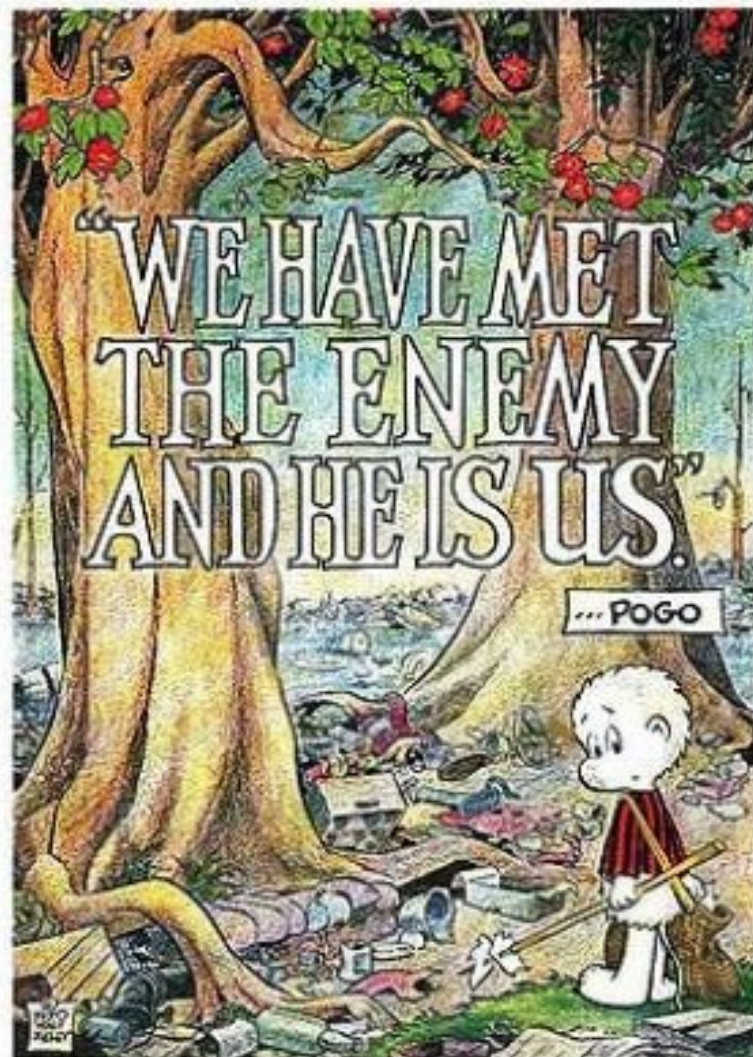
Flood Risk = P (Probability of flood X Consequences)



Residual Risk Can Be Increased

- ▶
- ▶
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➤ Flood losses = f (riparian area losses)



Walt Kelly's poster for the first Earth Day

RIPARIAN FLOODPLAINS

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RIPARIAN FLOODPLAINS

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- *Natural processes for riparian floodplains*

Opperman et al, 2010, Ecologically Functional Floodplains: Connectivity, Flow Regime, and Scale. Journal of the American Water Resources Association (JAWRA) 46(2):211-226. DOI; 10.1111/j.1752-1688.2010.00426.x

Periodic flooding of overbank areas is a natural process that supports healthy riparian corridors

RIPARIAN FLOODPLAINS

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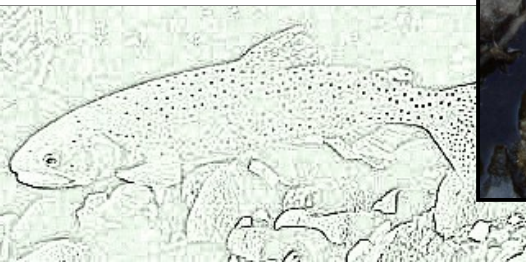


➤ *Diverse Ecosystem Services*

- *Shading, cooling*
- *Detritus supply*
- *Filtering*
- *Habitat value*
- *Bank Stabilization*
- *Groundwater recharge*
- *Replenish soils*
- *Plant life cycles*
- *Water quality*



- *Store and convey floodwaters*
- *Travel corridors*
- *Reduce erosion (fluvial, wave action)*
- *Biodiversity, breeding & feeding grounds*
- *Endangered species protection*
- *Hyporheic zone (aquatic insect habitat)*



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RIPARIAN FLOODPLAINS

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- Anthropogenic impacts

Urbanization often results in a transition from intermittent to perennial flow and the conversion of grassy swale systems to stream systems with defined bed and banks.

Urbanization accelerates stream degradation that disconnects low flow channels from floodplains.



RIPARIAN FLOODPLAINS Protect & be Protected

➤ Anthropogenic impacts



➤ Anthropogenic impacts/ Land management choices



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FLOODPLAIN PRESERVATION BROCHURE



Bill DeGroot, UDFCD Michelle Slovensky, Matrix
Design Group
David Mallory, UDFCD

Protection Serves ALL!

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Blake Street Bath & Racquet Club



URBANIZATION IMPACTS NATURAL DRAINAGEWAYS



RIPARIAN FLOODPLAINS

Protect & be Protected

➤ Protection serves ALL!



RIPARIAN FLOODPLAINS

Protect & be Protected

- Protection serves ALL!



RIPARIAN FLOODPLAINS

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“Real economic and environmental sustainability isn't just about the kind of buildings we build, but about where we build them.”

Secretary Donovan

U.S. Department of Housing & Urban Development
Interview with Urban Land Magazine

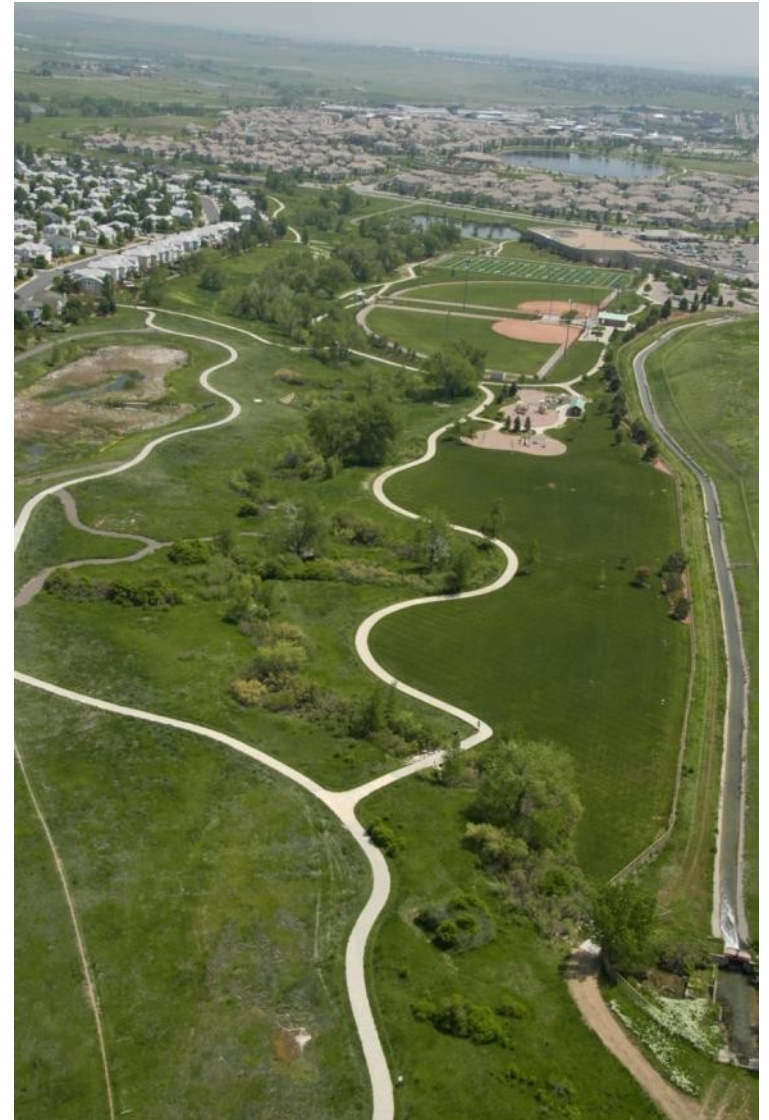
HIGHLANDS RANCH



HIGHLANDS RANCH



ROCK CREEK RANCH



HIDDEN RIVER



HIDDEN RIVER

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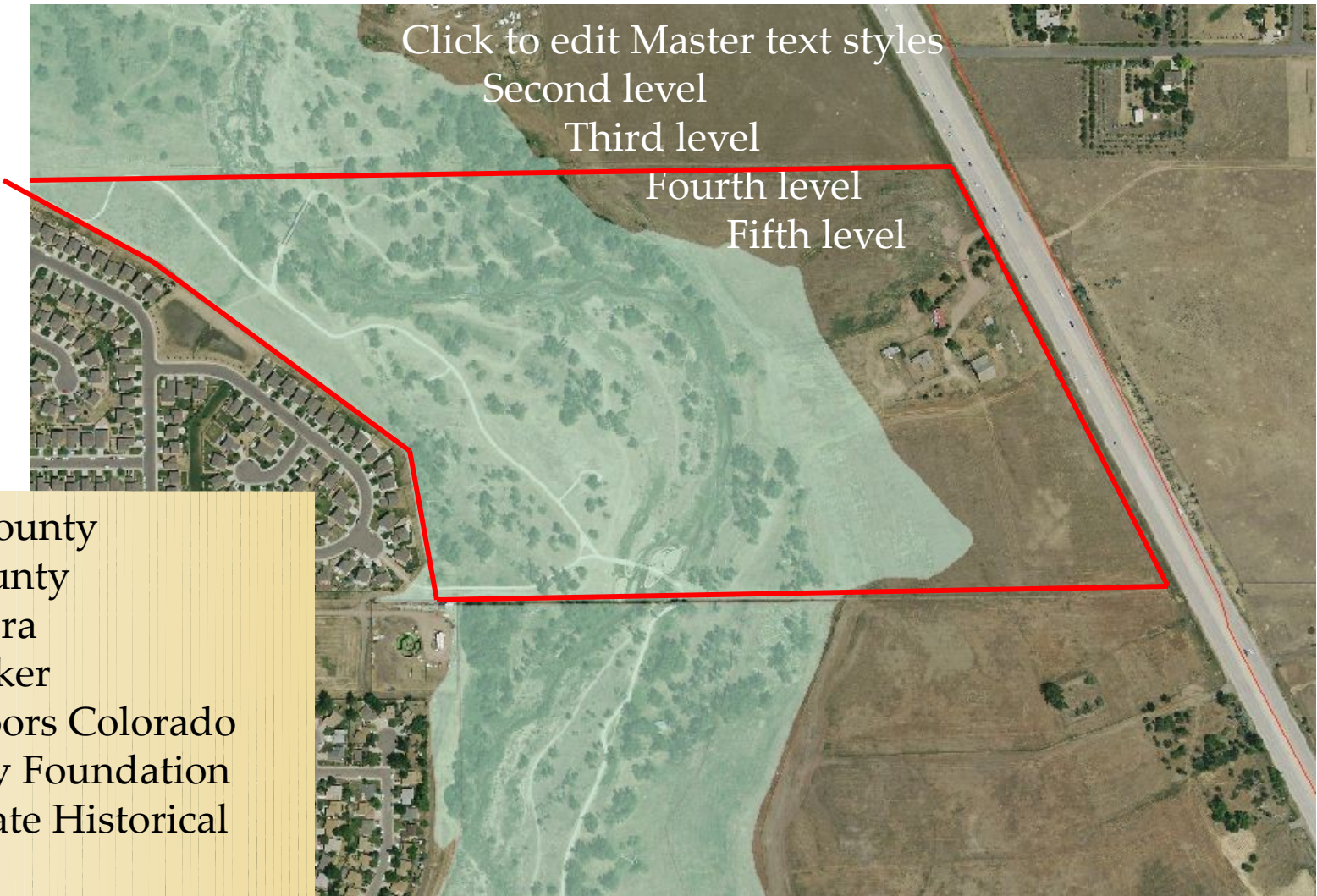
Second level

Third level

Fourth level

Fifth level





Arapahoe County
Douglas County
City of Aurora
Town of Parker
Great Outdoors Colorado
Gates Family Foundation
Colorado State Historical
Fund
Trust for Public Land
Urban Drainage

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Second level

Third level

Fourth level

Fifth level

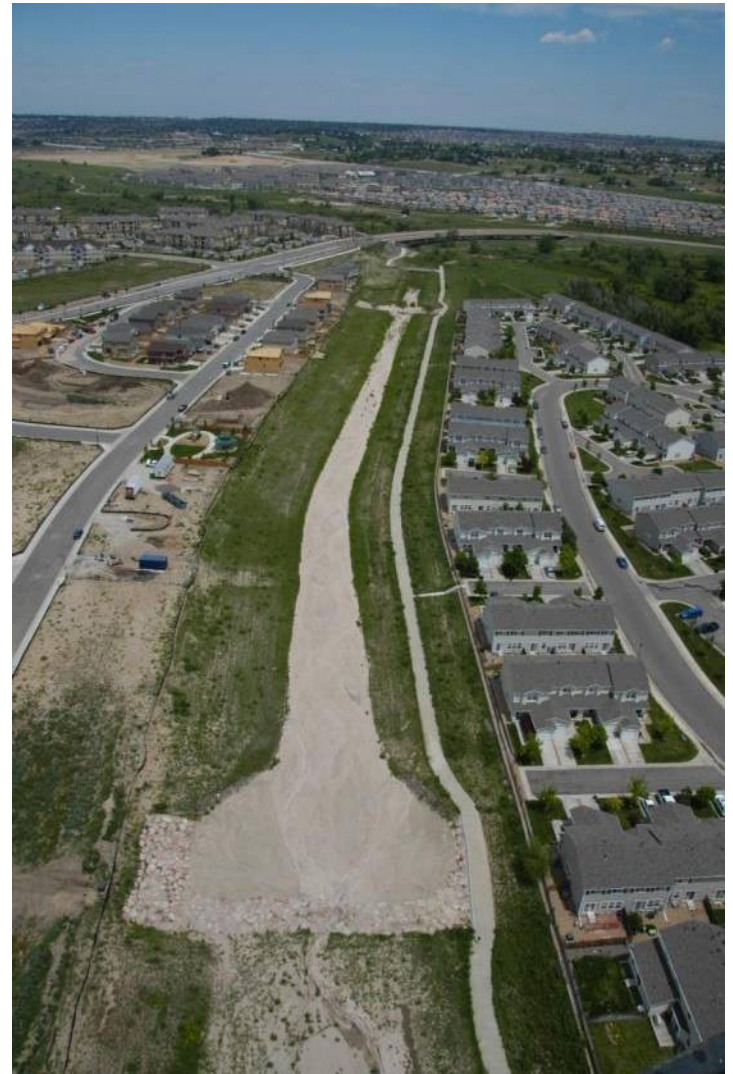


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Second level
Third level
Fourth level
Fifth level



RIPARIAN FLOODPLAINS

Protect & be Protected



How to get the concepts to developers and local governments earlier in the planning process?

◆

◆



Preserving the natural and beneficial values of floodplains adjacent to development projects

A guide for creating project value and selection of amenity enhancements.





Welcome

Bill DeGroot, UDFCD Floodplain Manager

Philosophy

Why preserve the natural and beneficial values of floodplains

Library Links

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UDFCD maintenance eligibility

Good Examples

Projects that exemplify holistic planning offer amenities for livable communities

Business Cases

Projects illustrating social, economic, and environmental benefits

PHILOSOPHY

- ◆
- ◆
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- ◆
- ◆
- ◆
- ◆





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- Welcome
- Acknowledgements
- Philosophy
- Business Cases
 - Stapleton Redevelopment
 - Westerley Creek
 - Highlands Ranch
 - Westminster Promenade
 - Preserve at Weaver Creek**
- Good Examples
 - Cultural Preservation
 - Regional Detention
 - Drop & Grade Control Structures
 - Floodplain Preservation
 - Golf Course
 - Infill Development
 - Low Flow Channel
 - Open Space
 - Riparian Preservation
 - Trails / Recreation
 - Water Quality / Wetlands
 - Library Links

Preserve at Weaver Creek

Developer: Fairfield Homes

Location: City of Lakewood, Jefferson County

Size: 113 acres, 164 residential condominium units

Consultant: David Evans Associates

Key Facts:

- Infill project, in that development and roads already surround the site
- Weaver Creek runs through the site from south to north with a continuous base flow
- Developer mapped wetlands and erected stone walls at the edge to create the large building footprints
- The floodplain was contained within the walls. A CLOMR and LOMR were prepared. The LOMR became effective on 5/13/04.
- UDFCD approved the plans 5/13/02. The City of Lakewood approved 5/21/02. Construction was completed 9/25/03.

Key features:

- Provided trails, maintenance access and one stream crossing with low flow culverts and pond. Otherwise the riparian and wetland habitat was preserved.

Benefits:

The developer charged a unit premium for the creek side units, \$5,000, \$7,000, and \$10,000 for the first, second, and third floors respectively. The premiums offset the cost of drainageway improvements (walls, trails, crossing and pond, stream stabilization and extra land given over to habitat preservation). The added bonus was all units were presold.



View of preserved wetlands



GOOD EXAMPLES

Good Examples

Projects	Cultural Preservation	Debris Retention	Drop Structures	Floodplain Preservation	Gulf Course	Wetland Development	Low Flow Channel	Open Space	Riparian Preservation	Trails Recreation	Wildlife Water Quality
Boar Creek				●	●		●	●	●		●
Big Dry Creek				●		●	●	●		●	
Brantner Gulch		●		●				●		●	●
City Park Drainage						●	●	●		●	●
Cherry Creek Damnr			●				●			●	
Cherry Creek Stream Stability	●		●	●			●	●	●		
Cherry Creek Steep Road			●	●			●	●	●		
Dancing Willows		●	●	●				●		●	●
Eagle Bend			●	●	●			●		●	●
Eastlake Village		●						●			●
Fountains Mill		●				●	●		●	●	●
Gateway Park		●						●		●	
Goldsmith Gulch			●					●		●	●
Grange Hall Creek Tributary #5			●				●	●		●	
Green Valley				●	●						●
Heritage Tote		●	●	●	●			●		●	●
Hickory River Road North							●	●	●	●	●
Highlands Ranch			●	●		●	●	●	●	●	●
Lakewood Gulch						●	●	●			
Larkridge Prairie Creek			●			●		●		●	●
Lena Gulch			●				●	●	●		
Massy Draw			●				●	●	●		
Murphy Creek	●		●	●				●			●
Parker Auto Plaza			●			●					
Parkfield		●		●		●		●	●	●	●
Piney Creek							●	●		●	●
Pinery West, Pradera GC		●	●	●	●			●		●	●
Prairie Gateway	●	●			●			●		●	●
Rock Creek			●	●			●	●			●
Rowley Downs Tallman			●	●				●		●	
Stapleton Washburn Creek		●	●	●		●	●	●		●	●
Sulphur Gulch		●	●				●	●			
South Shore			●							●	
Vance Street Corridor						●					
Village of Parker				●				●	●	●	●
Wheeler Creek						●				●	●
White Fences Farm	●	●				●		●		●	●

GOOD EXAMPLES



▲ Rock Creek

This view includes residential and commercial development, a water quality pond (foreground), pocket park, ballfields, and trails adjacent to the preserved and enhanced Rock Creek corridor in the Rock Creek Ranch development in the Town of Superior.

- Recreation
- Open Space
- Broad Floodplain
- Drop Structure
- Riparian Preservation
- Trails



▲ Westerly Creek

This view shows the broad floodplain that incorporates a meandering low flow, expansive open space that weaves through the different residential filings, drop structures, trails, bridges, riparian plant communities and a water quality structure with tiered water quality ponds. All made made structures were created to be formal in geometry to show the contrast to the natural preserve area that supports wildlife habitat. The water quality pond was composed of three tiered ponds to enhance infiltration and provide different ecological aspects for wildlife habitat (open water, nesting areas, and food source). Wetlands were extensively planted to create littoral zones and improve biofiltering for enhanced water quality. The outfall structure sculptured, and designed as a staging place for outdoor interpretive education.

- Recreation
- Open Space
- Drop Structure
- Low Flow
- Trails
- Broad Floodplain

Bookmarks

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- ⊕ Regional Detention
- ⊕ Drop & Grade Control Structures
- ⊕ Floodplain Preservation
- ⊕ Golf Course
- ⊕ Infill Development
- ⊕ Low Flow Channel
- ⊖ Open Space
 - Sanderson Gulch at White Fence Farm
 - Tallman Gulch at Hidden River**
 - Goldsmith Gulch at George Wallace Park
 - Rock Creek at Flatirons Mall
 - SJCD (S) at Meadows Sanctuary
 - Sulphur Gulch at Villages of Parker
- ⊕ Riparian Preservation
- ⊕ Trails / Recreation
- ⊕ Water Quality / Wetlands
- Library Links

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Open Space



▲ Tallman Gulch at Hidden River

Trails, open space, and pocket park uses characterize Tallman Gulch in this Town of Parker development.

- Floodplain Preservation
- Open Space
- Riparian Preservation
- Trails / Recreation

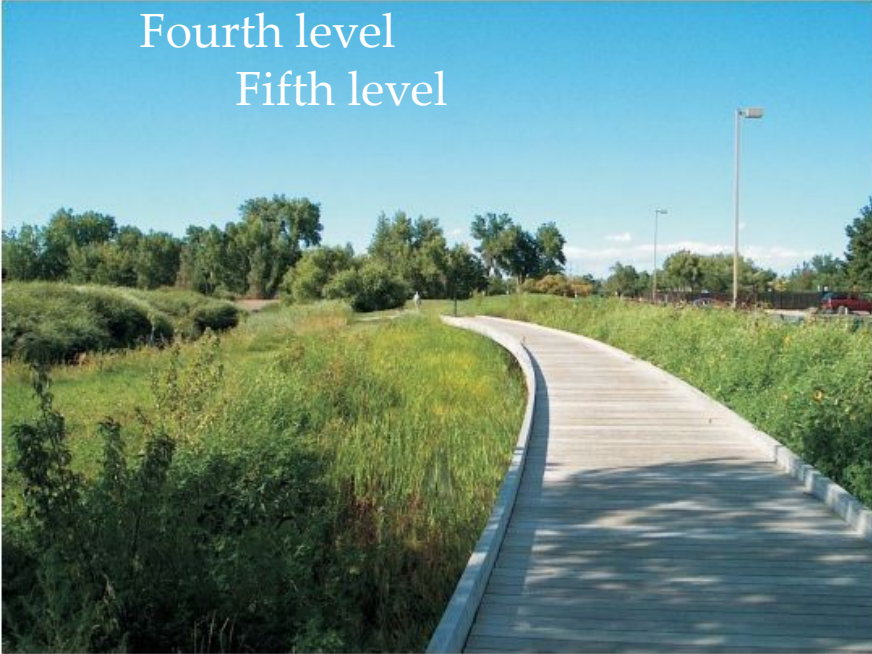
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- ⊖ Trails / Recreation
 - Irondale Gulch at Parkfield
 - Goldsmith Gulch at Hutchinson Park**
 - Cherry Creek at Denver
 - Big Dry Creek at Westminster City Park
 - Westerly Creek at Stapleton
 - Grange Hall Creek Tributary 5
 - Baldwin Gulch at Parker Auto Plaza
 - Happy Canyon Creek at Compark
- ⊕ Water Quality / Wetlands
- Library Links

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Trails/ Recreation



▲ Goldsmith Gulch at Hutchinson Park

This Denver park contains a large wetland area as well as an innovative and attractive recreation/maintenance trail.

- Drop Structure
- Riparian Preservation
- Open Space
- Trails / Recreation
- Wetlands / Water Quality

RIPARIAN FLOODPLAINS

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➤ Protection serves ALL!



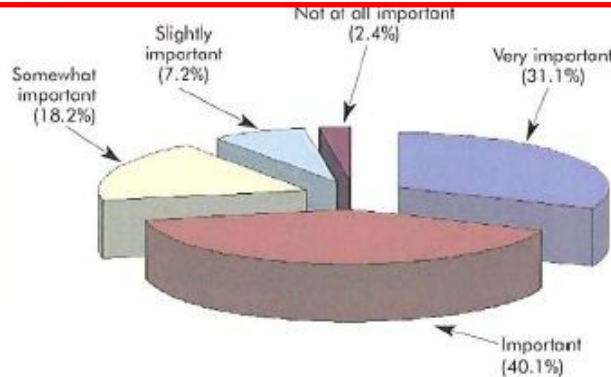
Survey of Highlands Ranch residents

3. WHAT CITIZENS THINK

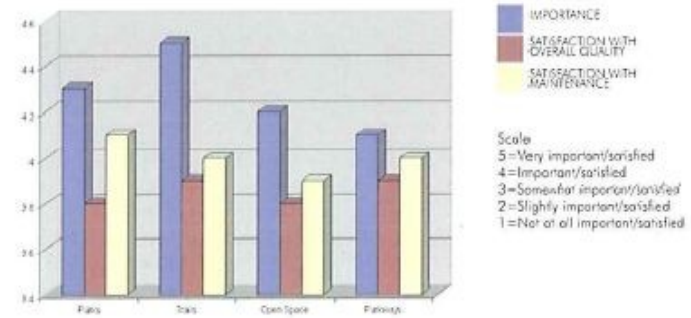
In 1999 a scientific survey of Highlands Ranch residents determined their attitudes and preferences regarding parks, recreation, and open space.

The survey results demonstrate that the community's parks, trails, open space, and parkways play an important role in the lives of most Highlands Ranch residents, including for many, even their original decision to move here.

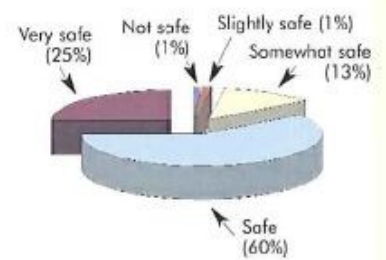
A. OVER 70% OF RESPONDENTS RANKED THE OUTDOORS AS "IMPORTANT" OR "VERY IMPORTANT" IN THEIR DECISION TO MOVE TO HIGHLANDS RANCH.



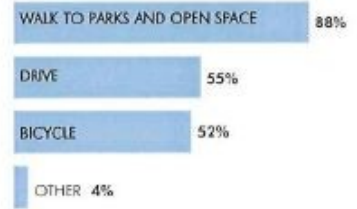
B. RESIDENTS VALUE EACH PART OF HR OUTDOORS, ESPECIALLY TRAILS. THEY ARE SATISFIED WITH THE OVERALL QUALITY AND LEVELS OF MAINTENANCE OF EACH COMPONENT OF THE PARKS, TRAILS, OPEN SPACE, AND PARKWAY SYSTEM.



C. MOST RESIDENTS FEEL "SAFE" OR "VERY SAFE" WHILE USING THE HR OUTDOORS SYSTEM.



D. MOST PEOPLE (88%) WALK TO THE COMMUNITY'S PARKS, TRAILS, AND OPEN SPACE AT LEAST SOME OF THE TIME. (n=501 for each.)



ENVIRONMENT AND DEVELOPMENT MYTH AND FACT

Urban Land Institute, 2002

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ENVIRONMENT AND DEVELOPMENT MYTH AND FACT

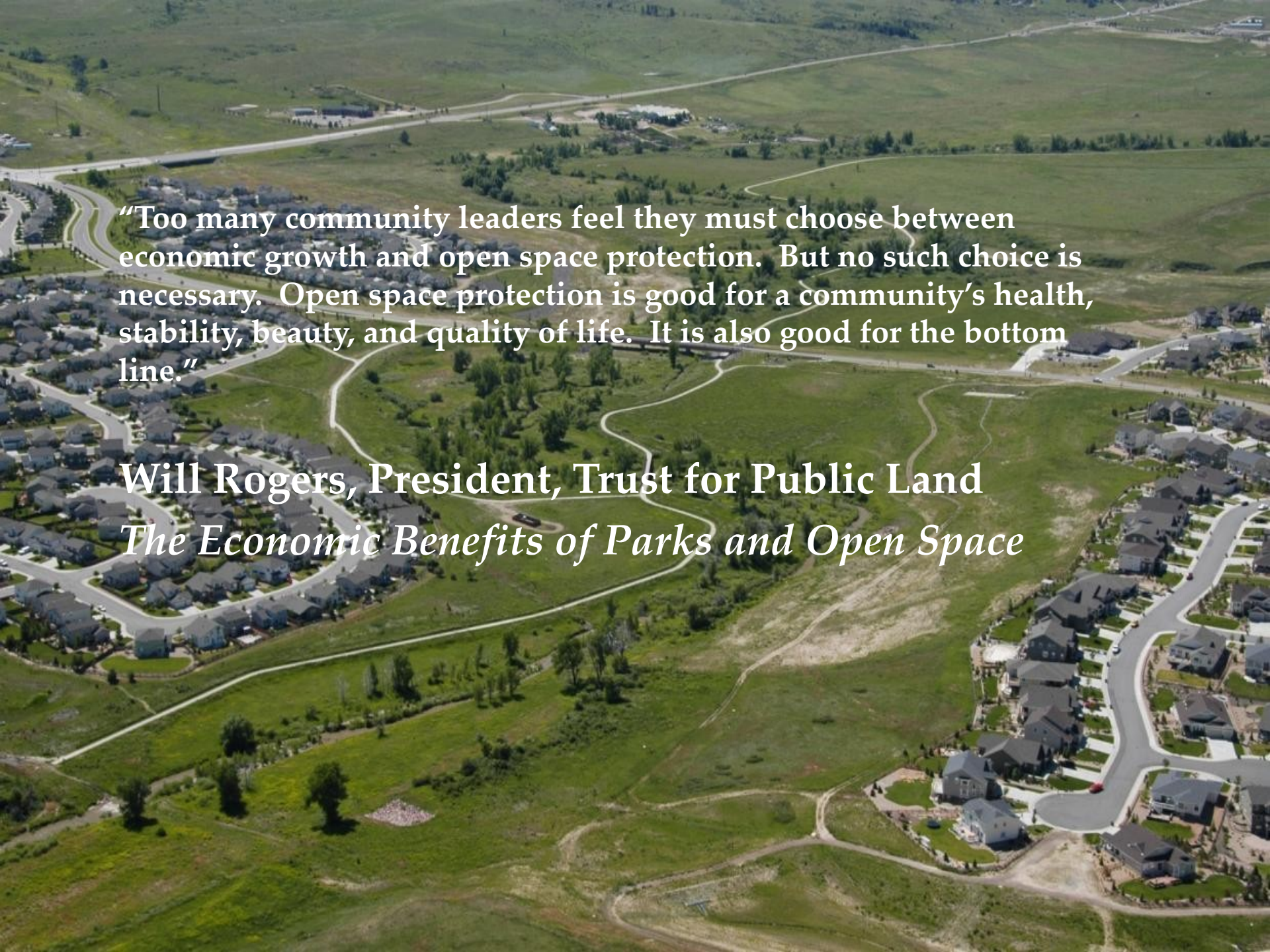
Urban Land Institute, 2002

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An aerial photograph of a suburban neighborhood. The image shows a mix of residential housing, green open spaces, and winding roads. The houses are mostly two-story structures with dark roofs, arranged in clusters. The open spaces are lush green fields with scattered trees and winding paths. The overall scene is a blend of urban development and natural landscape.

“Too many community leaders feel they must choose between economic growth and open space protection. But no such choice is necessary. Open space protection is good for a community’s health, stability, beauty, and quality of life. It is also good for the bottom line.”

Will Rogers, President, Trust for Public Land
The Economic Benefits of Parks and Open Space

- Protection serves ALL!

CONCLUSION



- Protection serves ALL!

CONCLUSION



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National Ecosystem Services Partnership

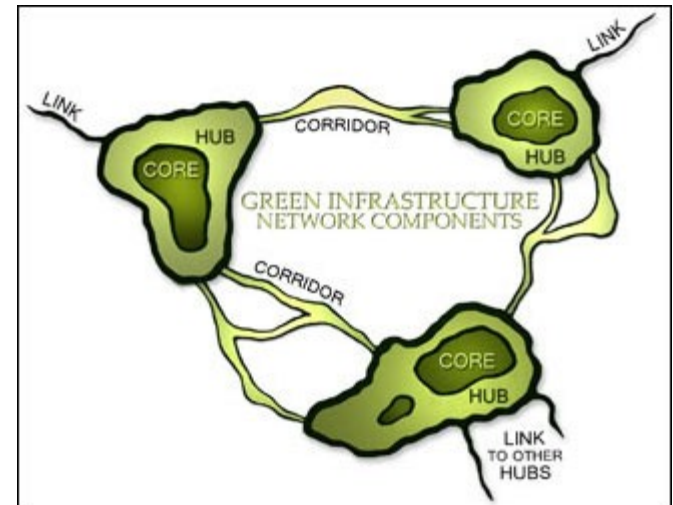


**PARTNERSHIP DEMOGRAPHICS
&
SUMMARY OF SURVEY**

APRIL 20TH, 2010

Llael Cox, Research Associate
Lydia Olander, NESP Acting Director
Kathryn Saterson, NESP Federal Agency Coordinator

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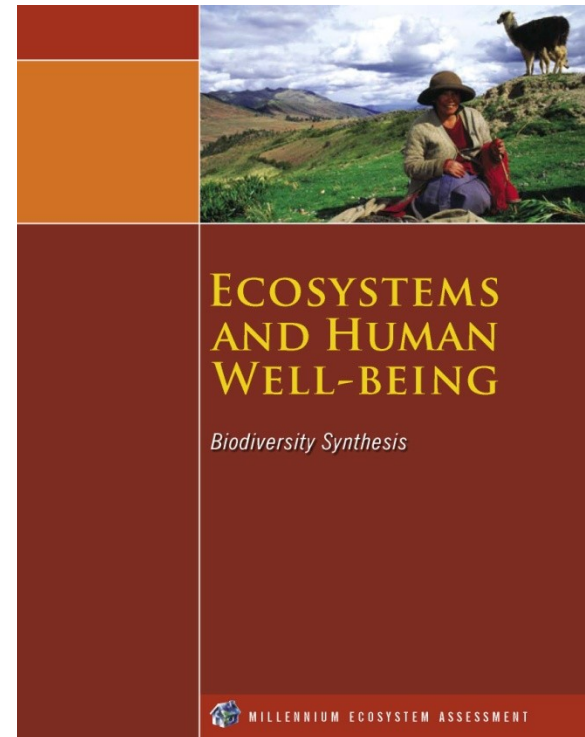


http://www.conservationfund.org/green_infrastructure

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THANK YOU!

