METROVISION IDEA EXCHANGE

Preparing Colorado for a Resilient Future

February 24, 2016

Meeting Overview

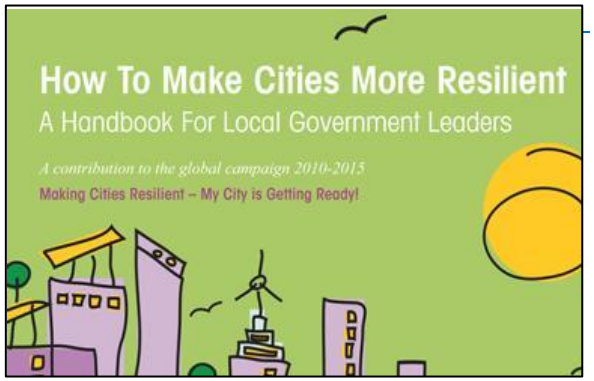
- Welcome & Introductions
- Overview of Resiliency Planning
- Colorado Resiliency Framework
- Planning for Hazards: Land Use Solutions for Colorado
- Integrating Hazards and Resilience into Local Planning
- Discussion

Today's Panel: See Packet for Bios

- Andrew Rumbach, Assistant Professor, University of Colorado Denver
- Iain Hyde. Deputy Director, Colorado Resiliency and Recovery Office
- Anne Miller, AICP, Senior Planner, Colorado Department of Local Affairs
- Dale Case, AICP, Land Use Director, Boulder County

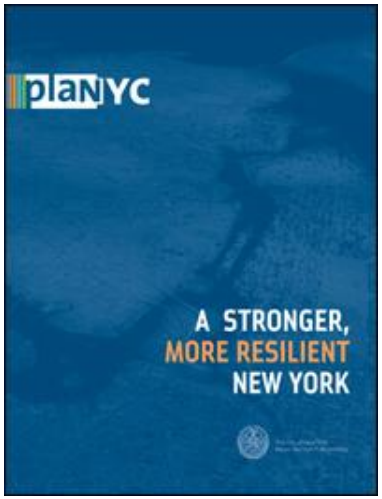
Resilience

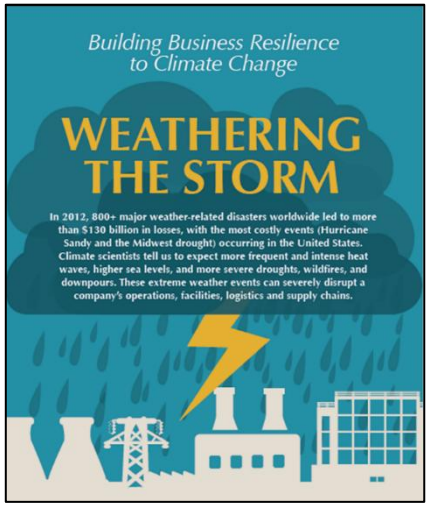
A (Very) Brief Overview

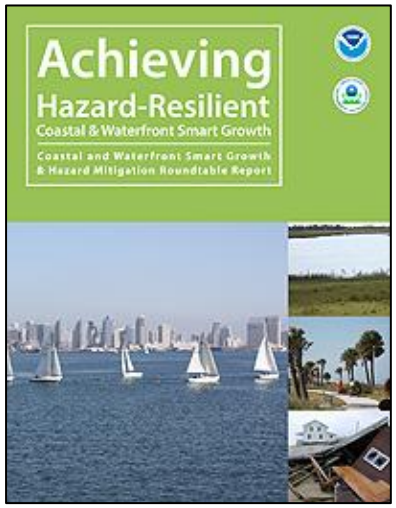

How To Make Cities More Resilient
A Handbook For Local Government Leaders
A contribution to the global campaign 2010-2015
Making Cities Resilient – My City is Getting Ready!


Resilient
Communities Project


100 RESILIENT CITIES
NETWORK MEMBER
100RESILIENTCITIES.ORG
PIONEERED BY THE ROCKEFELLER FOUNDATION


planYC
A STRONGER,
MORE RESILIENT
NEW YORK


Building Business Resilience
to Climate Change
WEATHERING
THE STORM
In 2012, 800+ major weather-related disasters worldwide led to more than $130 billion in losses, with the most costly events (Hurricane Sandy and the Midwest drought) occurring in the United States. Climate scientists tell us to expect more frequent and intense heat waves, higher sea levels, and more severe droughts, wildfires, and downpours. These extreme weather events can severely disrupt a company's operations, facilities, logistics and supply chains.


Achieving
Hazard-Resilient
Coastal & Waterfront Smart Growth
Coastal and Waterfront Smart Growth
& Hazard Mitigation Roundtable Report

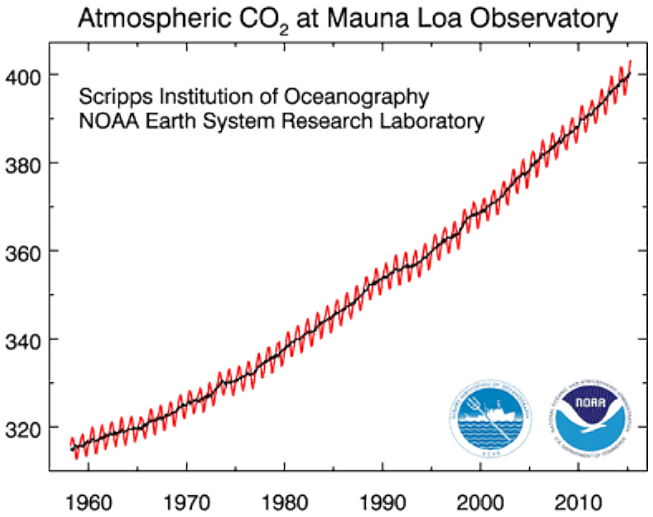

CENTER FOR
RESILIENT
CITIES
Good Living Well Grounded

What is Resilience? Two Metaphors

- Resilio: leap or spring back; rebound
  - Households, communities or systems 'bounce back' after a shock or stress
  - Implies that we want to return to previous state - is that a good thing?
- Resilience akin to health and well-being
  - Everyday activities like eating well and exercising make our bodies more able to handle unexpected illnesses and injuries
  - The benefits of a community being in 'shape' are not always obvious, until disaster strikes

‘Acts of God’ ➡ Hazards to Defend Against ➡ Prepare & Respond ➡ Mitigation & Vulnerability Reduction

Uncertainty and the Origins of Resilience



The goal of resilience is for communities to anticipate, withstand and recover quickly from shocks and stresses, with minimal outside assistance

Why Resilience?

- From negatives to positives
  - Disaster risk reduction, vulnerability, hazard mitigation > community resilience
- Recognizes complexity and interconnectedness of natural and human systems
- Shifts planning away from 'one time' events and towards a recognition of hazards as ongoing and routine features of environmental systems
  - Incorporate disaster planning and management into everyday actions and plans
- Accepts uncertainty as part of planning

Characteristics of Resilient Communities

- **Anticipate** shocks and stresses and take meaningful actions to address them, i.e. they assess risk
- Build **redundancy** into core human and infrastructural systems to prevent catastrophic failures
- Promote **diversity** by continually seeking to include a wide range of "publics" in decision making processes
- Work to remain **flexible** to adapt to unexpected shocks and inevitable change
- Build excess **capacity** to marshal during times of disaster
- Create meaningful feedback loops from experience to policy and practice, i.e. they never stop **learning**

Emerging Questions About Resilience

- Resilience of what? for whom?
- Is resilience a process? An outcome? Both?
- Resilience at what scale?
- How do we measure / assess / monitor resilience?
- Who is responsible?

Thank You!

- Andy Rumbach
  - Assistant Professor of Planning and Design at University of Colorado Denver
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State Resiliency & Recovery Efforts

COLORADO

Resiliency & Recovery Office

Governor John W. Hickenlooper

What is Resiliency?

"The ability of communities to rebound and positively adapt to or thrive amidst changing conditions or challenges – including disasters and changes in climate – and maintain quality of life, healthy growth, economic vitality, durable systems and conservation of resources for present and future generations."

- Colorado Resiliency Working Group

Resiliency Considerations

Quality of life

- *Colorado consistently ranks as one of the best places to live in the US*

Healthy growth

- *Colorado is expected to increase by 2.7 million by 2040; how do we effectively manage this growth?*

Durable systems

- *Systems and services are able to withstand high levels of pressure and stress and continue to function, including during natural hazards and economic shocks*

Conservation of resources

- *Critical resources that impact public health, economic output, healthy ecosystems, and quality of life are protected assets*

Population Current and Projected –Statewide and Select Counties

Jurisdiction	2010 Census	Estimated 2013	Estimated 2020	Estimated 2040
State of Colorado	5,029,196	5,264,890	5,924,692	7,752,887
City and County of Denver	604,879	648,978	734,079	867,545
Boulder County	294,567	309,874	335,076	396,163
Larimer County	299,630	315,728	356,900	471,612
El Paso County	622,263	655,812	728,610	955,871
Eagle County	52,057	52,360	57,226	94,085

*Source: Colorado Department of Local Affairs Demography Office

Colorado Disaster History

Disaster	Communities Impacted	Disaster Impacts
1965 Floods	Colorado Front Range (South Platte and Arkansas basins)	21 lives lost; $540M damages (1965 dollars); resulted in construction of Chatfield and Bear Creek reservoirs
Big Thompson Flood (1976)	Primarily Larimer County between Estes Park and Loveland	8 inches of rain in a one hour period;145 lives lost; 418 houses destroyed.
2002 Drought and Wildfires	Statewide. Major fires included Hayman, Coal Seam, Missionary Ridge and others	Hayman fire burned 137k acres; Missionary Ridge 70k acres; Chronic debris flow and post-wildfire floods
2012-2013 Fires	Statewide. Large fires in Larimer, El Paso, Fremont counties and the San Luis Valley	More than 1100 homes destroyed, $1.2B in insurance claims
2013 floods	24 counties impacted	10 lives lost; 1800 homes destroyed, $3.9B in damages

Vulnerability To Shocks and Stresses

Shocks cause significant immediate damage, injuries and deaths or result in sudden changes to a community. They can include:

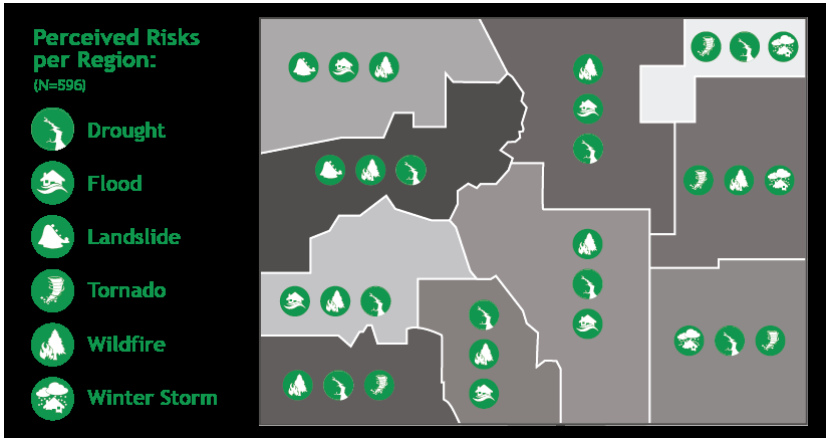
- **Natural hazards**, such as wildfires, flooding or winter storms.
  - Is drought a shock or stress? Both?
- **Human-caused hazards** such as hazardous materials spills, acts of violence/terrorism.

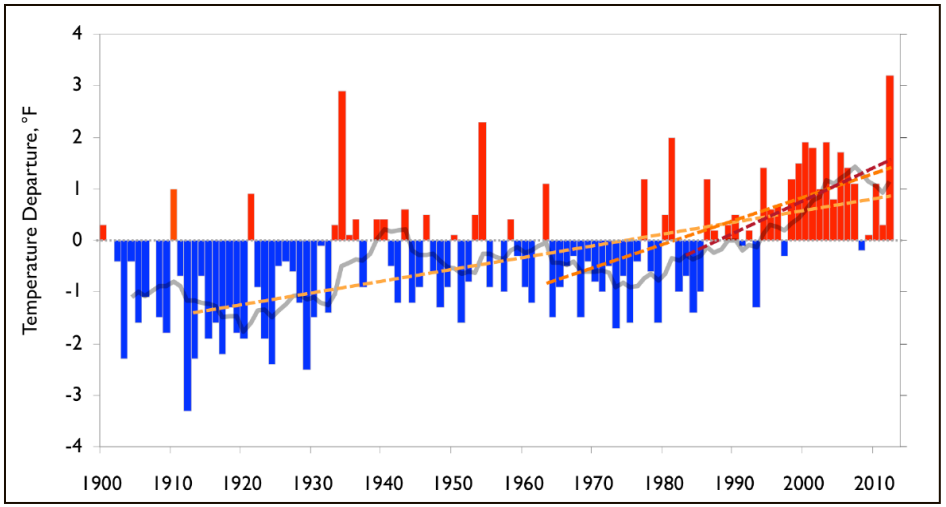
Stresses are chronic conditions that magnify vulnerability and make it it harder to recover from shocks, such as:

- **Economic** or **social** stresses, like high unemployment, affordable housing shortage, aging infrastructure or lack of social cohesion.
- **Environmental** stresses, such as, changing climate conditions, poor water quality or forest health.

Why Prioritize Resiliency?

- History tells us Colorado is not immune to disasters; they will happen again
- Conditions are changing
- Population is growing
- We want to preserve and enhance our way of life
- Federal policy moving towards the need for more state and local pre-disaster action





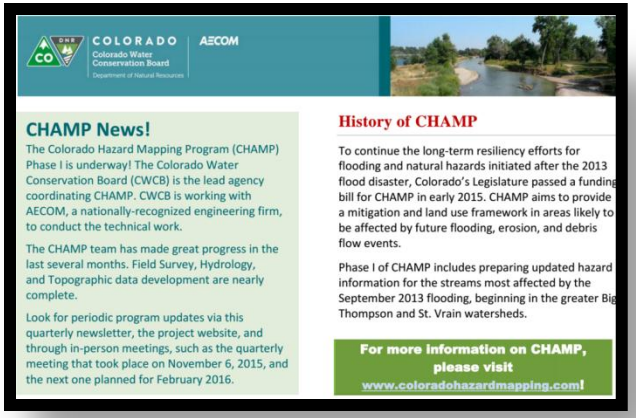
The Resiliency ROI

Wildfire mitigation saves Cedar Heights neighborhood and 187 homes in Colorado Springs during Waldo Canyon Fire in 2012

Longmont Left Hand Creek channel improvements; $5.4 million in investment pre-flood ,$22 million in estimated losses avoided during 2013; ***3.91 ROI****.*

National Institute of Building Sciences report:

For every $1 invested in mitigation, $4 return in future losses avoided. Resiliency expands notion of ROI to economic, environmental, social benefits.


COLORADO
Colorado Water Conservation Board
AECOM

CHAMP News!

The Colorado Hazard Mapping Program (CHAMP) Phase I is underway! The Colorado Water Conservation Board (CWCB) is the lead agency coordinating CHAMP. CWCB is working with AECOM, a nationally-recognized engineering firm, to conduct the technical work.

The CHAMP team has made great progress in the last several months. Field Survey, Hydrology, and Topographic data development are nearly complete.

Look for periodic program updates via this quarterly newsletter, the project website, and through in-person meetings, such as the quarterly meeting that took place on November 6, 2015, and the next one planned for February 2016.

History of CHAMP

To continue the long-term resiliency efforts for flooding and natural hazards initiated after the 2013 flood disaster, Colorado's Legislature passed a funding bill for CHAMP in early 2015. CHAMP aims to provide a mitigation and land use framework in areas likely to be affected by future flooding, erosion, and debris flow events.

Phase I of CHAMP includes preparing updated hazard information for the streams most affected by the September 2013 flooding, beginning in the greater Big Thompson and St. Vrain watersheds.

For more information on CHAMP, please visit www.coloradohazardmapping.com!

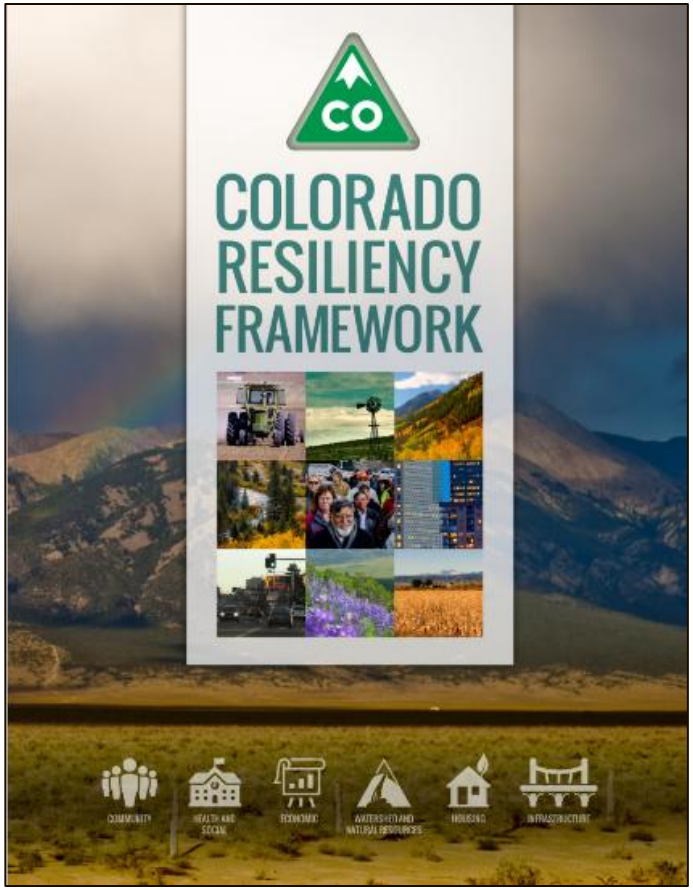
Local, state and FEMA partnerships to update hydrology and hazard maps; communities utilizing up-to-date risk information in recovery/reconstruction efforts

What Have We Accomplished So Far?

- Colorado Resiliency Framework and Annual Operating Plan
- Pilot local resiliency strategy plans
- Resiliency built into recovery grant programs

Colorado Resiliency Framework

- Result of 2-year partnership across state, 150+ stakeholders from state, federal, local government and non-governmental organizations
- Governor adopted the Framework May 28th, 2015
- Establishes a vision and definition of resilience for the State of Colorado
- Seeks to empower a culture of resilience in Colorado communities
- Identifies guiding principles
- Outlines specific and concrete strategies



Resiliency Sectors and Partners

COLORADO
Department of Transportation
Region 4

COLORADO
Resiliency & Recovery Office
Governor John W. Hickenlooper

COLORADO
Department of Local Affairs

FEMA

EDA
U.S. ECONOMIC DEVELOPMENT ADMINISTRATION

COLORADO
Division of Homeland Security
& Emergency Management
Department of Public Safety

COLORADO
Office of Economic Development
& International Trade

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

COLORADO
Department of Natural Resources

COLORADO
Department of Human Services

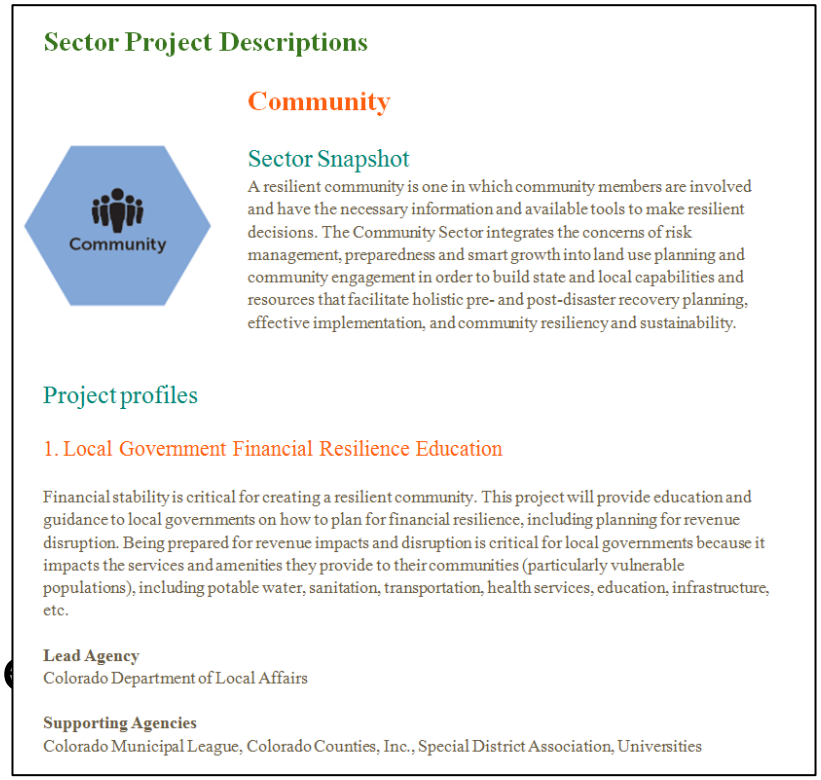
COLORADO
Energy Office

U.S. Department of Transportation
Federal Highway Administration

COLORADO
Department of Public
Health & Environment

Framework Annual Operating Plan

- Developed and implemented each year
  - Includes projects from all six Framework sectors for 2016
  - Will be available on www.coloradounited.com in coming weeks
- Annual resiliency report at the end of each year



Sector Project Descriptions

Community

Community

Sector Snapshot

A resilient community is one in which community members are involved and have the necessary information and available tools to make resilient decisions. The Community Sector integrates the concerns of risk management, preparedness and smart growth into land use planning and community engagement in order to build state and local capabilities and resources that facilitate holistic pre- and post-disaster recovery planning, effective implementation, and community resiliency and sustainability.

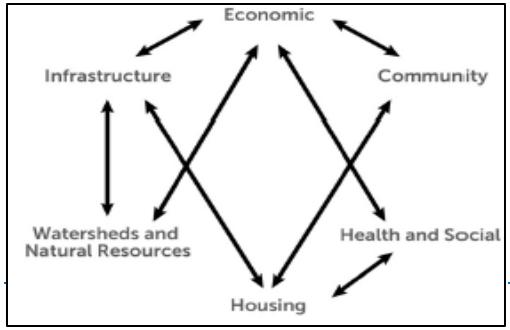
Project profiles

1. Local Government Financial Resilience Education

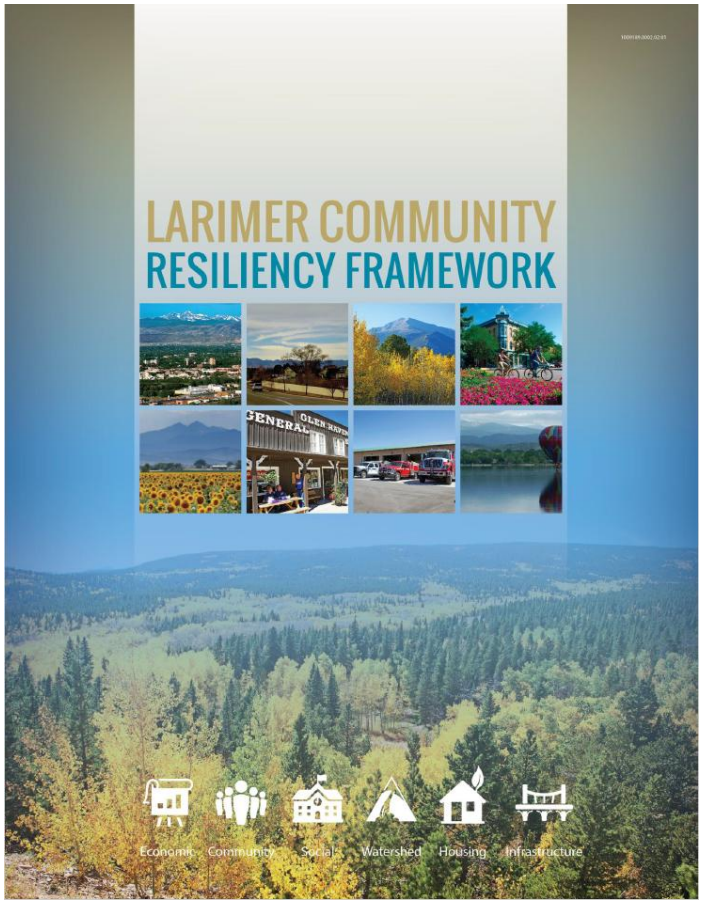
Financial stability is critical for creating a resilient community. This project will provide education and guidance to local governments on how to plan for financial resilience, including planning for revenue disruption. Being prepared for revenue impacts and disruption is critical for local governments because it impacts the services and amenities they provide to their communities (particularly vulnerable populations), including potable water, sanitation, transportation, health services, education, infrastructure, etc.

Lead Agency
Colorado Department of Local Affairs

Supporting Agencies
Colorado Municipal League, Colorado Counties, Inc., Special District Association, Universities



Pilot Local Resiliency Plans

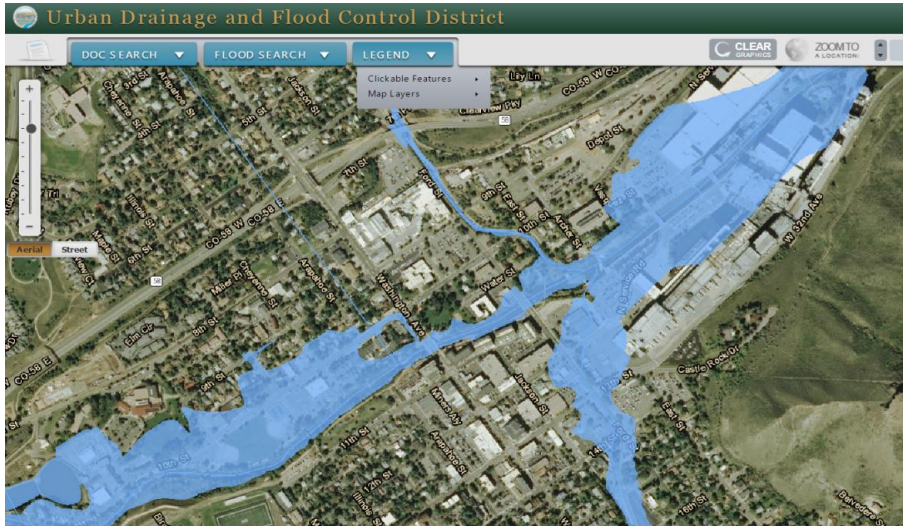


- Three pilot county-wide plans in highly flood/fire impacted counties:
  - Boulder
  - Larimer
  - El Paso
- Evaluate existing conditions, shocks and stresses across sectors
- Identify broad range of strategies
- State Framework model/guide for local plans

What Can Communities Do?

Understand

- Educate yourselves and staff about what resiliency is and why it matters
- Develop partnerships – across sectors and across jurisdictions
- Engage networks, neighborhoods and community members and build social capital

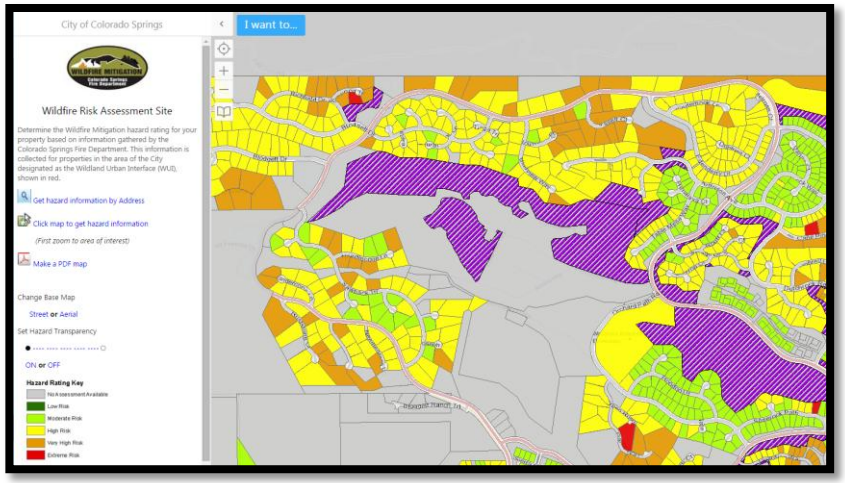


Source: Urban Drainage and Flood Control District

What Can Communities Do?

Plan

- *Build a team* to coordinate activities across sectors; partner with private sector non-profits
- *Establish a vision* for resilience in your community
- *Thoroughly study your current and future risk;* understand hazards in the context of stresses
- *Develop a local resiliency plan*
- *Integrate risk and resiliency* into local plans and policies



Source: Colorado Springs Fire Department

What Can Communities Do?

Act

- Invest in resiliency practices; build resiliency criteria into budgeting process (i.e., capital improvements)
- Integrate resiliency into design standards and practices (housing, infrastructure, watersheds)
- Implement resiliency projects that achieve multiple benefits (i.e., infrastructure protection, economic development and water quality)
- Dedicate staff to resiliency efforts

What Could DRCOG Potentially Do?

- Facilitate or participate in development of a regional resiliency framework to align with Metro Vision 2040

- Continue to integrate resiliency concepts into future Metro Vision updates and other regional planning efforts
  - Already aligns with many principles, including open space protection, GhG reduction, regional housing needs, etc.

- Fantastic DRCOG data, analysis and GIS work provides a foundation to study how risk to metro communities will change over time in the region
  - Population growth, changing climate conditions, interface of urbanization and flood risk, growth in Wildland Urban Interface etc.
  - Partner with Urban Drainage and Flood Control District (UDFCD) or other organizations?

Questions?

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PLANNING FOR HAZARDS
Land Use Solutions for Colorado

DRCOG – Metro Vision Idea Exchange

February 24, 2016

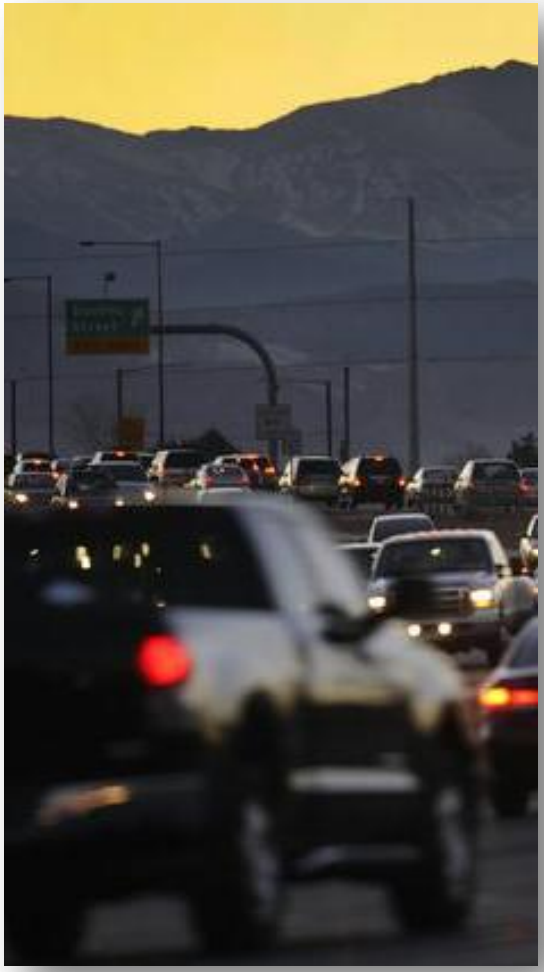
Overview

- Why planning for hazards is important to Colorado
- Approaches to planning for hazards
- Overview of the planning for hazards guide
- Moving forward – next steps

Why Planning for Hazards is Important to Colorado

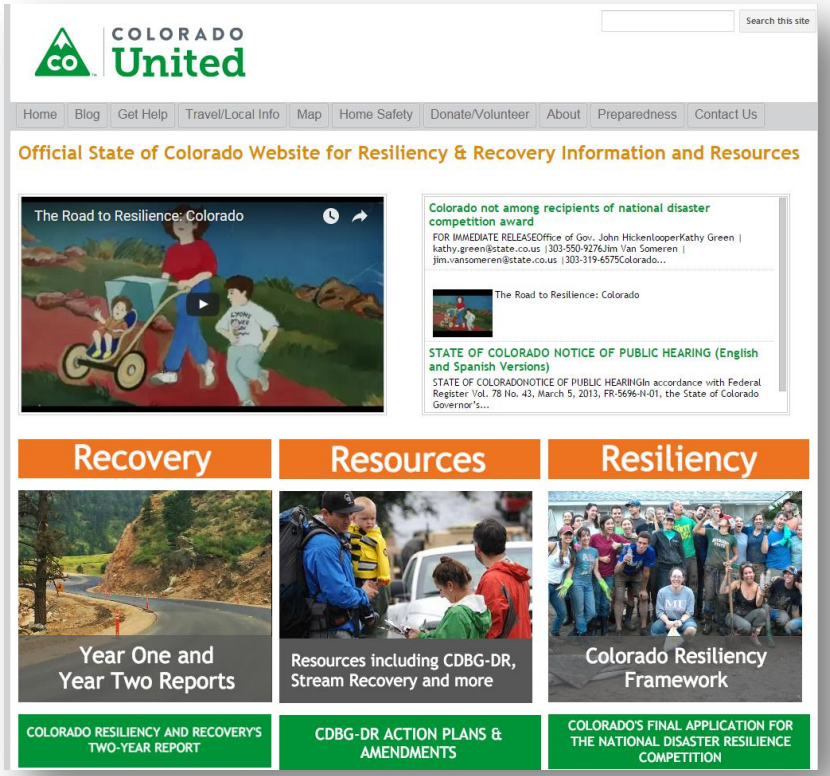
Why Colorado?

- The population is growing
- We are no stranger to hazards (and they are increasing in frequency and severity)
- Many communities face hazards
  - Riparian areas (floodways)
  - Forested areas (wildland-urban interface)
  - Ridgelines with (great views/steep slopes)



State Resiliency Framework

- *Colorado Resiliency Framework 2015*
- A "call to action" for Colorado communities
- This guide identified as an action



Approaches to Planning for Hazards

Approaches to Consider

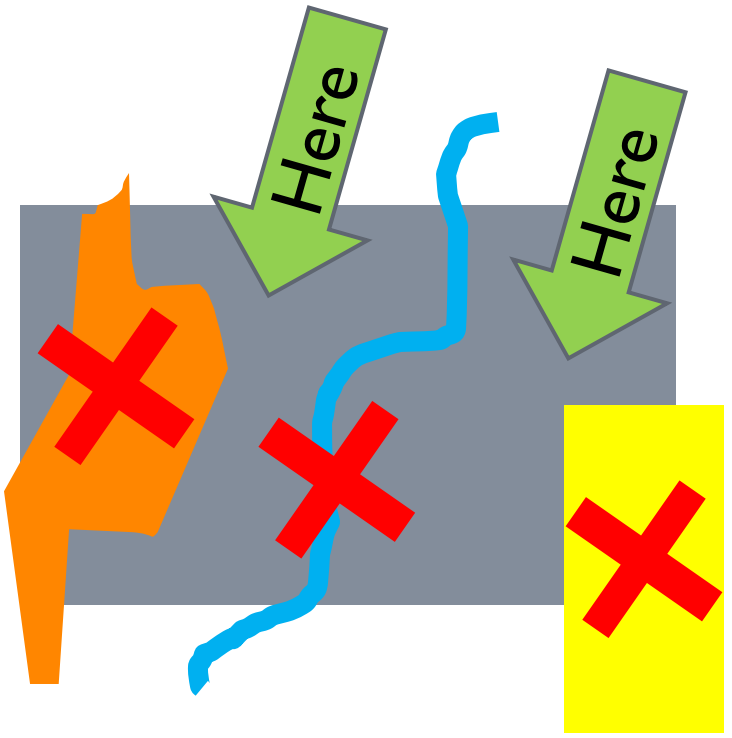
Avoidance

The most effective way to protect development from hazards is simply to prohibit development in known hazard areas.

But that's not always possible……

Approaches to Consider

- Prevent development in hazardous areas
- Direct future growth to safer areas
- Strengthen existing development in hazardous areas



Consider Community Context

- Size and geographic location
- Technical, administrative, and financial capacity
- Community goals and political will

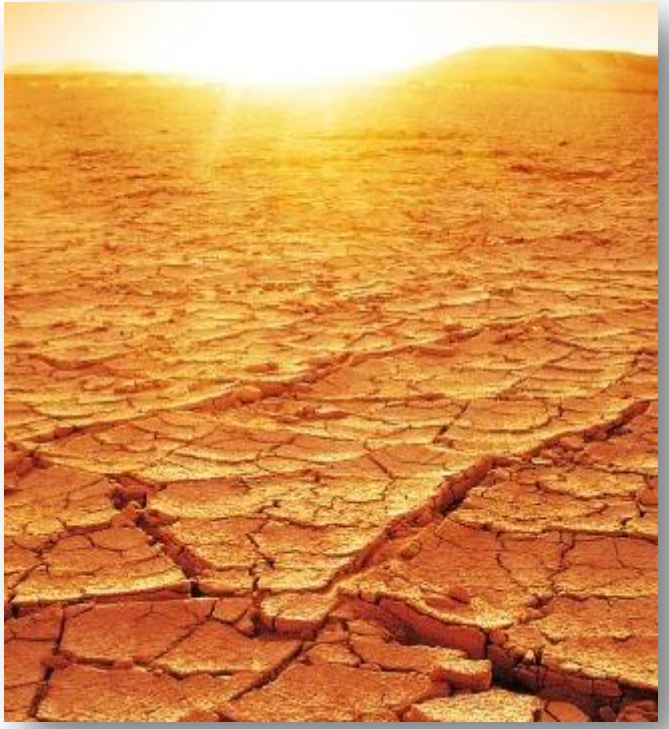
Consider the Interrelatedness of Hazards

For example:

- Drought → Fire
- Lightning → Fire
- Fire → Flooding
- Fire → Debris Flow
- Flooding → Soil Hazards

Consider Climate Change

- Colorado Climate Plan (2015) suggests that Colorado temperatures will increase another 2.5 to 5 degrees Fahrenheit by 2050
  - Longer and more severe droughts
  - Faster and earlier snowmelt
  - More frequent periods of extreme heat



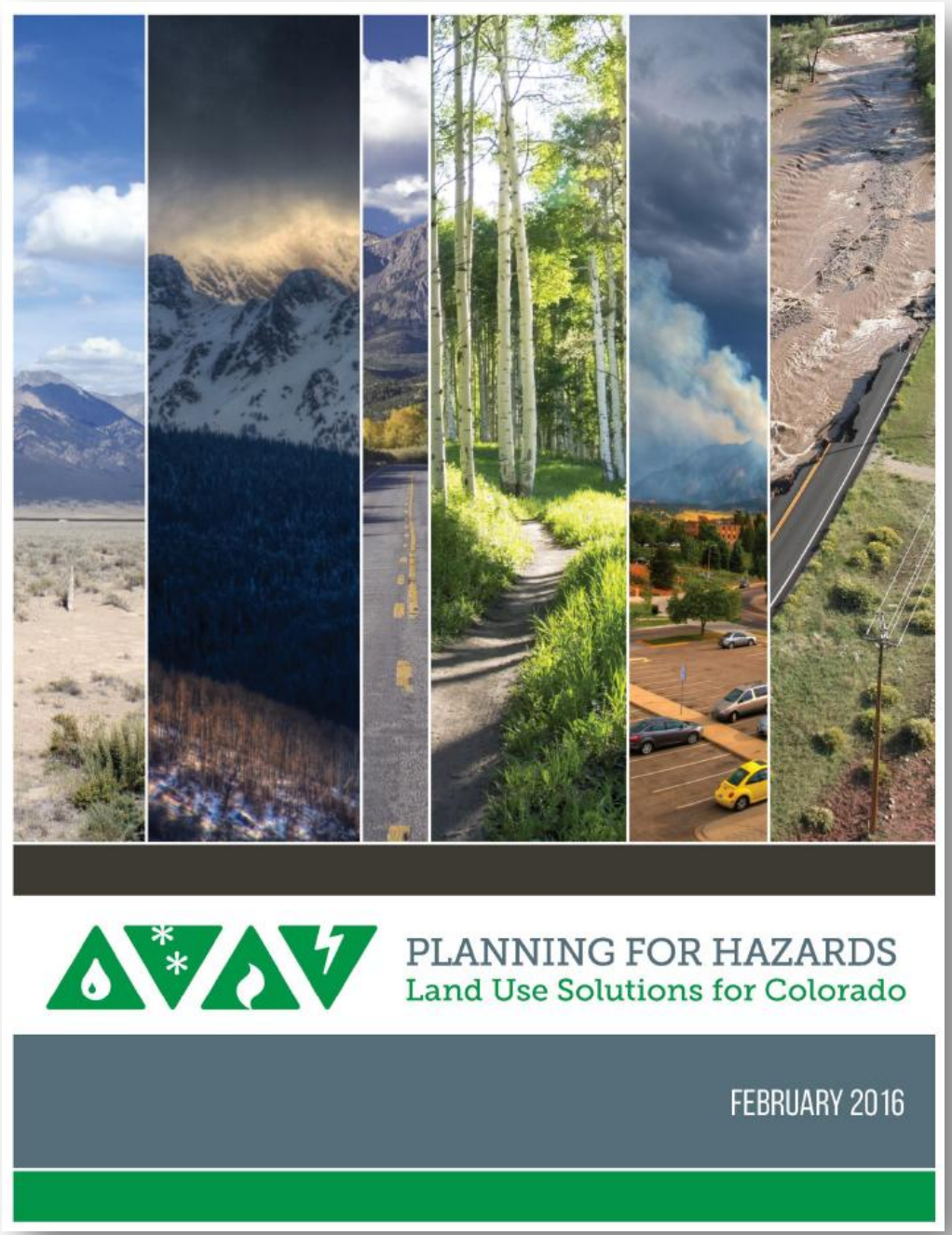
Planning for Hazards – A Collaborative Approach

- Land use planners
- Emergency managers
- Elected and appointed officials
- Public works officials
- Citizens
- Community advocates
- Business owners
- Developers

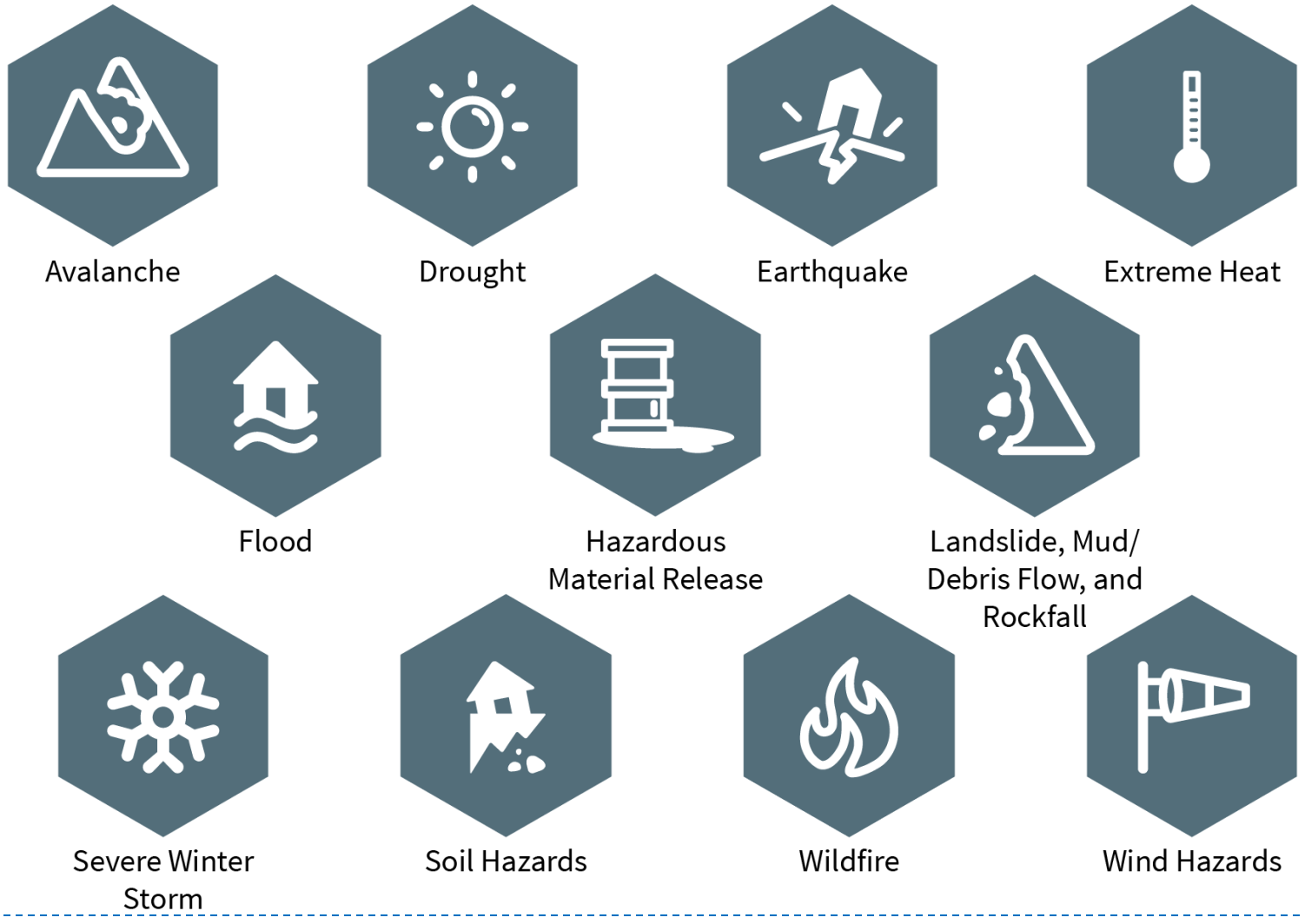
Overview of the Planning for Hazards Guide

Outline:

- Introduction and Summary
- Planning Framework
- Hazard Identification and Risk Assessment
- Planning Tools and Strategies
- Moving Forward
- Appendix – Hazards in Colorado



The Hazards Lineup



Planning Tool Profiles - Categories

- Addressing hazards in plans and policies
- Strengthening incentives
- Protecting sensitive areas
- Improving site development standards
- Improving buildings and infrastructure
- Enhancing administration and procedures

Planning Tool Profiles – The Lineup

- Integrating Risk Reduction into Comprehensive Plans
- Climate Plan
- Community Wildfire Protection Plan (CWPP)
- Hazard Mitigation Plan
- Parks and Open Space Plan
- Pre-Disaster Planning
- Community Rating System
- Development Agreements
- Transfer of Development Rights
- Density Bonuses
- 1041 Regulations
- Cluster Subdivisions
- Land Acquisition
- Overlay Zoning
- Stream Buffers and Setbacks
- Low-Impact Development and Stormwater Management BMPs
- Site-Specific Assessments
- Subdivision and Site Layout Standards
- Use-Specific Standards
- Building Code
- Critical Infrastructure Protection
- WUI Code
- Application Submittal Requirements
- Post-Disaster Building Moratorium

What's in the Tool Profiles?

SUBDIVISION AND SITE DESIGN STANDARDS

HOW IT WORKS

Subdivision and site design standards are used by communities to regulate how parcels of land are divided into developable lots, and how those lots are subsequently designed and laid out through the development process. Subdivision typically includes the creation of a sketch plan (showing basic lot layout and provisions for public infrastructure), and subsequent creation of a more detailed preliminary plat (indicating building footprints and specific measurements), and then culminating in a final plat that creates the new lots. Abbreviated procedures are typically established for minor subdivisions that involve the creation of just a handful of lots.

Site design standards are related and define the basic parameters for development on individual lots, including maximum or minimum lot size, how buildings are situated on a lot, traffic and circulation patterns, pedestrian connectivity, preservation of open areas, and avoidance of hazardous areas.

Communities increasingly consider hazard mitigation when adopting site layout standards. For example, applicants are required to avoid mapped hazard areas (like floodplains) in new development or to develop strategies to mitigate the hazard risk.

IMPLEMENTATION

As communities grow, they should identify where new growth should be concentrated through long-range planning mechanisms, such as the comprehensive planning process. There can be pressure to locate new development in areas that are known to be at risk from hazards. Communities must balance competing interests when reviewing proposed development. For example, the need for additional workforce housing in a community should be balanced against the desire to protect natural areas, view corridors, and natural hazard areas, as well as the safety and welfare of future inhabitants of the development. Communities are challenged with keeping development out of

IMPROVING SITE DEVELOPMENT STANDARDS
SUBDIVISION AND SITE DESIGN STANDARDS

harm's way while allowing individuals to develop land consistent with stated policies. Communities can often find middle ground through subdivision standards that allow for new subdivisions to be approved when they meet conditions to mitigate hazards, such as water cisterns for wildfire protection, slope stabilization for landslide and rockfall, and keeping buildable lots out of the floodplain. Additional incentives and regulations can be explored such as **cluster subdivisions**, **density bonuses**, and **Transfer of Development Rights (TDRs)**, each of which are good tools for promoting avoidance of hazards. Each of these are discussed in separate planning tool profiles.

According to APA's *Zoning Practice* issue on Safe Growth Audits (Godschalk, 2009), communities should ask themselves the following questions related to their subdivision regulations:

1. Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?
2. Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?
3. Do the regulations allow density transfers where hazard areas exist?

As with zoning codes, adoption of subdivision ordinances or site layout standards requires approval by the governing body (City Council, Board of Trustees, or County Commissioners).

WHERE IT'S BEEN DONE

Pagosa Springs adopted sensitive area protection standards for subdivisions and for redevelopment of existing areas in its Land Use and Development Code (2015). The standards generally address the following issues:

- **Slopes.** Slopes greater than 30 percent, or are otherwise unstable or subject to hazards, are not allowed to be platted or developed for residential uses without mitigation controls in place.
- **Natural Features.** Subdivisions or development shall protect waterways, vegetation, and rocks and other natural features or vistas.
- **Areas of Special Flood Hazard.** Mapped flood hazard areas identify areas where subdivisions shall not be approved without evidence that it is not in a flood hazard or meets other flood damage protection regulations to the satisfaction of the floodplain administrator.
- **Geologic Hazard Areas.** Subdivisions and site plans must meet mitigation conditions prior to approval in mapped geologic hazard areas in the Town as the information becomes available, including provisions to prevent danger to human life or property.
- **Wildfire Hazard Areas.** Applicants for subdivisions or other development must provide evidence from a professional forester that the proposal meets several conditions, including adequate roads for emergency services and criteria for wildfire areas published by the Colorado State Forest Service.
- **Perimeter Fencing.** Limits the height to protect migration of elk and deer.
- **Riparian Setbacks.** To promote and preserve the quality of the river ecology, aesthetic, and recreation.

In addition to these standards, approval criteria for major subdivisions also address areas that may involve soil or topographical conditions that present hazards.

What's in the Tool Profiles?

KEY FACTS

Administrative capacity	Experienced planner with city or county attorney to write ordinance. Skilled planners to administer program and track implementation
Mapping	Technical mapping of sending and receiving areas is typically required
Regulatory requirements	Land use regulations. Also, an intergovernmental agreement (IGA) typically is used if the TDR program is administered as a joint initiative between multiple jurisdictions
Maintenance	Yes, requires extensive on-going tracking mechanism for TDRs
Adoption required	Yes, the requirements and conditions for TDRs must be specified in the local land use regulations
Statutory reference	General zoning and land use regulatory authority. Home rule authority. See earlier discussion in the *Planning Framework*
Associated costs	Extensive staff time. TDRs will require outside consulting for land value expertise and dedicated staff for long-term maintenance of the program

EXAMPLES

Boulder County Land Use Code	bouldercounty.org/doc/landuse/lucodearticle06.pdf Section 6-700
City of Fruita Land Use Code	fruita.org/sites/default/files/fileattachments/community_development/page/242/17.09.pdf Chapter 17.09 TDR
Mesa County Land Development Code	mesacounty.us/planning/land-development-code.aspx Section 9.8 Transferable Density Credits
Pitkin County Land Use Code	pitkincounty.com/DocumentCenter/View/5858 Section 6-70
Routt County PDR program	www.co.routt.co.us/DocumentCenter/View/16
Summit County TDR program	co.summit.co.us/index.aspx?NID=187
King County, Washington TDR bank	kingcounty.gov/environment/stewardship/sustainable-building/transfer-development-rights/bank.aspx

FOR MORE INFORMATION

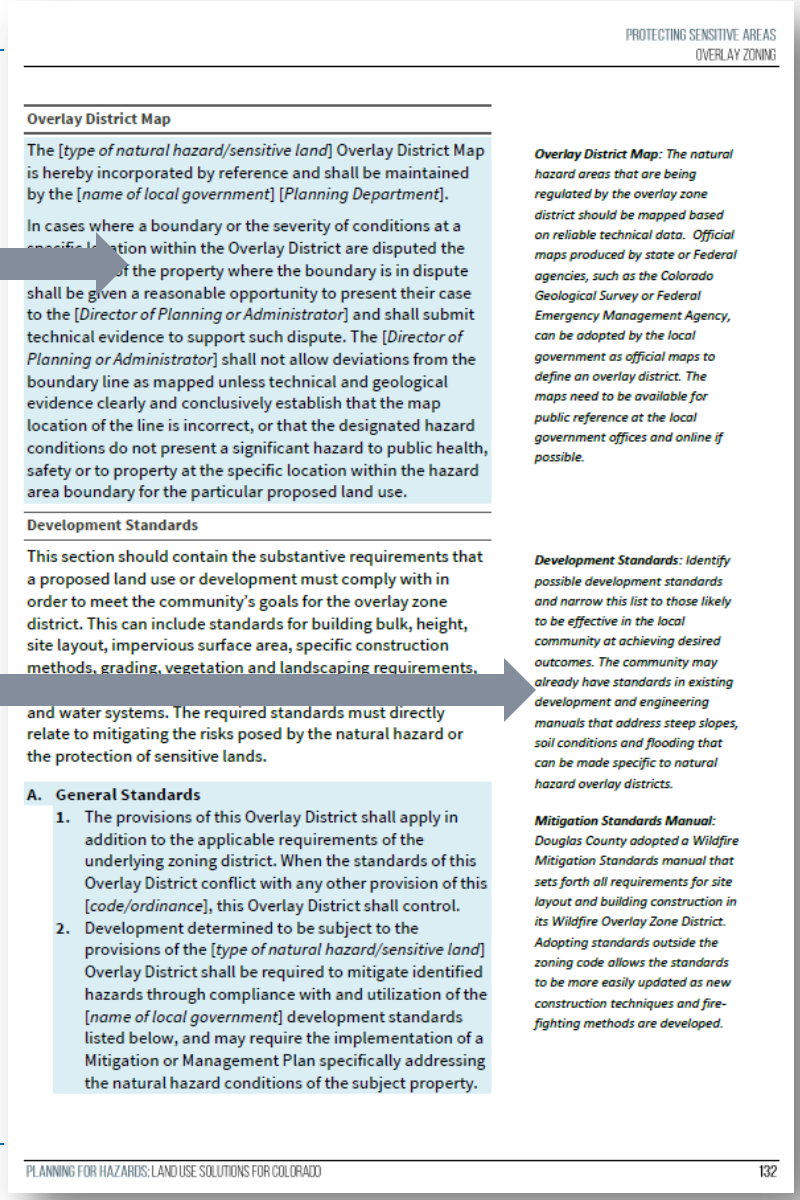
American Planning Association Planning Advisory Service - PAS Memo May/June 2010: "TDR-Less TDR Revisited."
clarionassociates.com/pdfs/duerksen-tdr-less.pdf

Model Code Language

- Integrating Risk Reduction into Comprehensive Plans
- Climate Plan
- Community Wildfire Protection Plan (CWPP)
- Hazard Mitigation Plan
- Parks and Open Space Plan
- Pre-Disaster Planning
- Community Rating System
- Development Agreements
- Transfer of Development Rights
- Density Bonuses
- 1041 Regulations
- Cluster Subdivisions
- Land Acquisition
- Overlay Zoning
- Stream Buffers and Setbacks
- Low-Impact Development and Stormwater Management BMPs
- Site-Specific Assessments
- Subdivision and Site Layout Standards
- Use-Specific Standards
- Building Code
- Critical Infrastructure Protection
- WUI Code
- Application Submittal Requirements
- Post-Disaster Building Moratorium

Model Code Language

- Language to be tailored for local governments (in blue)
- Based on several best practices throughout Colorado and the nation
- Includes commentary for further explanation (in margin)



Overlay District Map

The [*type of natural hazard/sensitive land*] Overlay District Map is hereby incorporated by reference and shall be maintained by the [*name of local government*] [*Planning Department*].

In cases where a boundary or the severity of conditions at a specific location within the Overlay District are disputed the owner of the property where the boundary is in dispute shall be given a reasonable opportunity to present their case to the [*Director of Planning or Administrator*] and shall submit technical evidence to support such dispute. The [*Director of Planning or Administrator*] shall not allow deviations from the boundary line as mapped unless technical and geological evidence clearly and conclusively establish that the map location of the line is incorrect, or that the designated hazard conditions do not present a significant hazard to public health, safety or to property at the specific location within the hazard area boundary for the particular proposed land use.

Overlay District Map: *The natural hazard areas that are being regulated by the overlay zone district should be mapped based on reliable technical data. Official maps produced by state or Federal agencies, such as the Colorado Geological Survey or Federal Emergency Management Agency, can be adopted by the local government as official maps to define an overlay district. The maps need to be available for public reference at the local government offices and online if possible.*

Development Standards

This section should contain the substantive requirements that a proposed land use or development must comply with in order to meet the community's goals for the overlay zone district. This can include standards for building bulk, height, site layout, impervious surface area, specific construction methods, grading, vegetation and landscaping requirements, and water systems. The required standards must directly relate to mitigating the risks posed by the natural hazard or the protection of sensitive lands.

Development Standards: *Identify possible development standards and narrow this list to those likely to be effective in the local community at achieving desired outcomes. The community may already have standards in existing development and engineering manuals that address steep slopes, soil conditions and flooding that can be made specific to natural hazard overlay districts.*

Mitigation Standards Manual: *Douglas County adopted a Wildfire Mitigation Standards manual that sets forth all requirements for site layout and building construction in its Wildfire Overlay Zone District. Adopting standards outside the zoning code allows the standards to be more easily updated as new construction techniques and fire-fighting methods are developed.*

A. General Standards

1. The provisions of this Overlay District shall apply in addition to the applicable requirements of the underlying zoning district. When the standards of this Overlay District conflict with any other provision of this [*code/ordinance*], this Overlay District shall control.
2. Development determined to be subject to the provisions of the [*type of natural hazard/sensitive land*] Overlay District shall be required to mitigate identified hazards through compliance with and utilization of the [*name of local government*] development standards listed below, and may require the implementation of a Mitigation or Management Plan specifically addressing the natural hazard conditions of the subject property.

Case Study – Cluster Subdivisions

Applicability

A. Cluster subdivisions are permitted in the [*name of district(s)*] zoning districts.

B. Clustering of lots is required in the following:

1. New subdivisions in the [*name of district(s)*] zoning districts.
2. New subdivisions in a wildfire hazard area of [insert range of severity level of mapped wildfire hazard areas].

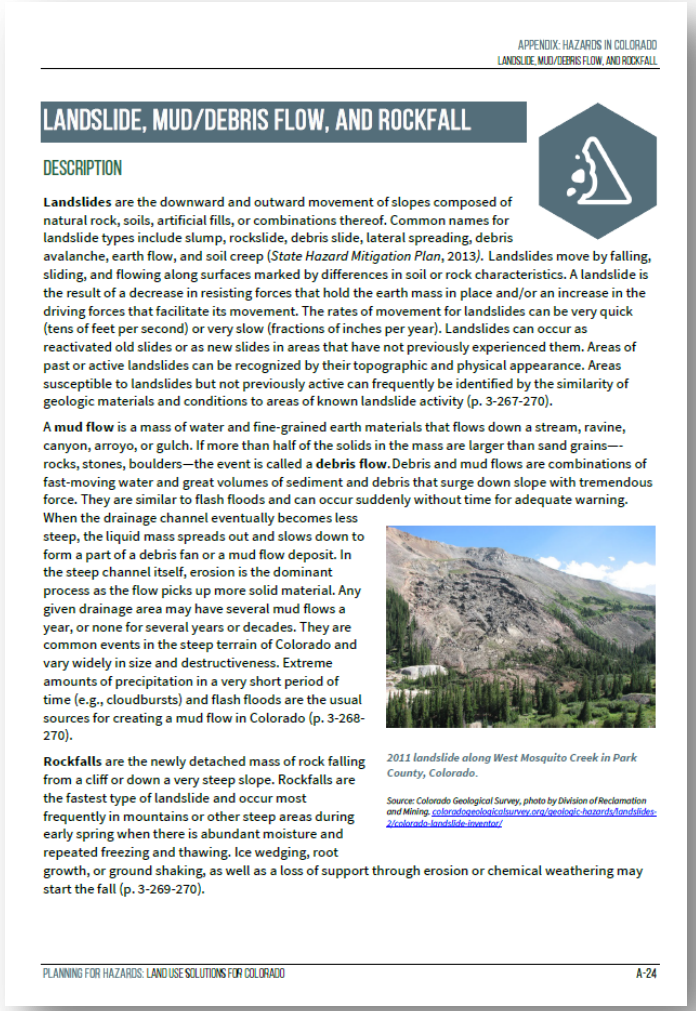
Applicability: *Cluster subdivision can either be mandatory or optional. Many communities limit the districts where clustering benefits can be achieved (such as low-density residential or agricultural districts). For mapped hazard areas, communities can require clustering in certain instances (e.g., high to extreme wildfire hazard rating). Mapping can be tied to the comprehensive plan or hazard mitigation plan.*

Case Study – Cluster Subdivisions

SW County	**Archuleta County** Subdivision Regulations	archuletacounty.org/index.aspx?nid=247
Big City	**City of Aurora** Small Lot Development Standards	municode.com/library/co/aurora/codes/building_and_zoning
	DOLA Model Codes Cluster Subdivision Regulations	colorado.gov/pacific/dola/land-use-codes
Small Town	**City of Durango** Cluster Development	online.encodeplus.com/regs/durango-co
	Larimer County Rural Land Use Process	co.larimer.co.us/planning/planning/landuse
Front Range	**City of Longmont** Cluster Lot Subdivisions	municode.com/library/co/longmont/codes/code_of_ordinances
	Town of Pagosa Springs Conservation Subdivisions	municode.com/library/CO/pagosa_springs/codes/code_of_ordinances
	Routt County Land Preservation Subdivision	www.co.routt.co.us/index.aspx?nid=194
	San Miguel County Areas and Activities of Local and State Interest	sanmiguelcounty.org/243/Land-Use-Code
Resort County	**Summit County** Rural Land Use Subdivision Process	co.summit.co.us/DocumentCenter/Home/View/63 (Section 8420)

Appendix – Hazards in Colorado

- **Expanded information related to the hazards profiled in the guide. Each hazard includes:**
  - Description of the hazard
  - Hazard risk in Colorado
  - Related hazards
  - Available data sources
  - Summary of applicable planning tools and strategies



APPENDIX: HAZARDS IN COLORADO
LANDSLIDE, MUD/DEBRIS FLOW, AND ROCKFALL

LANDSLIDE, MUD/DEBRIS FLOW, AND ROCKFALL

DESCRIPTION

Landslides are the downward and outward movement of slopes composed of natural rock, soils, artificial fills, or combinations thereof. Common names for landslide types include slump, rockslide, debris slide, lateral spreading, debris avalanche, earth flow, and soil creep (*State Hazard Mitigation Plan*, 2013). Landslides move by falling, sliding, and flowing along surfaces marked by differences in soil or rock characteristics. A landslide is the result of a decrease in resisting forces that hold the earth mass in place and/or an increase in the driving forces that facilitate its movement. The rates of movement for landslides can be very quick (tens of feet per second) or very slow (fractions of inches per year). Landslides can occur as reactivated old slides or as new slides in areas that have not previously experienced them. Areas of past or active landslides can be recognized by their topographic and physical appearance. Areas susceptible to landslides but not previously active can frequently be identified by the similarity of geologic materials and conditions to areas of known landslide activity (p. 3-267-270).

A **mud flow** is a mass of water and fine-grained earth materials that flows down a stream, ravine, canyon, arroyo, or gulch. If more than half of the solids in the mass are larger than sand grains—rocks, stones, boulders—the event is called a **debris flow**. Debris and mud flows are combinations of fast-moving water and great volumes of sediment and debris that surge down slope with tremendous force. They are similar to flash floods and can occur suddenly without time for adequate warning. When the drainage channel eventually becomes less steep, the liquid mass spreads out and slows down to form a part of a debris fan or a mud flow deposit. In the steep channel itself, erosion is the dominant process as the flow picks up more solid material. Any given drainage area may have several mud flows a year, or none for several years or decades. They are common events in the steep terrain of Colorado and vary widely in size and destructiveness. Extreme amounts of precipitation in a very short period of time (e.g., cloudbursts) and flash floods are the usual sources for creating a mud flow in Colorado (p. 3-268-270).

2011 landslide along West Mosquito Creek in Park County, Colorado.

Source: Colorado Geological Survey, photo by Division of Reclamation and Mining. coloradogeologicalsurvey.org/geologic-hazards/landslides-2/colorado-landslide-inventor/

Rockfalls are the newly detached mass of rock falling from a cliff or down a very steep slope. Rockfalls are the fastest type of landslide and occur most frequently in mountains or other steep areas during early spring when there is abundant moisture and repeated freezing and thawing. Ice wedging, root growth, or ground shaking, as well as a loss of support through erosion or chemical weathering may start the fall (p. 3-269-270).

PLANNING FOR HAZARDS
Land Use Solutions for Colorado

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Purpose of the Guide

Learn how the Hazard Mitigation Guide can help your community address risks and integrate hazard mitigation into policies, regulations, and standards.

Intro

This guide provides detailed, Colorado-specific information about how to assess a community's risk level to hazards and how to implement several land use planning tools and strategies for reducing a community's risk.

Read the Guide

To explore this guide or specific chapters in the traditional format, Page-by-Page from start to finish, look for the purple Table of Contents on the top right and the previous/next buttons on the bottom of each page.

Goals of the Website

- Accommodate different user experiences
- Offer user-friendly interface
- Make it easy to access information from the printed guide
- Bring the document to life through enriched media
- Maintain it over time

JANE

JIM

JOHN

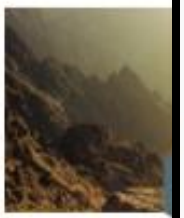
"Jim's Scenario"

Interested in wildfire, Jim has some burning questions…

- How does wildfire impact Colorado communities?
- What types of planning tools can address wildfire?
- What other hazards can be addressed with the same planning tool?
- Is there model code language for that planning tool?

Learn how the H

Avalanche



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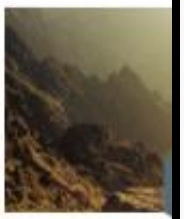
Hazardous Material Release



Extre

Wildfire

Wind Hazards

Severe Winter Storm

Close

Wildfire

On This Page

Description

The Colorado Natural Hazards Mitigation Plan defines a **wildfire** as an unplanned, unwanted **wildland fire**, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out[36]. Wildland fire occurs when vegetation, or "fuel," such as grass, leaf litter, trees, or shrubs, is exposed to an ignition source and the conditions for combustion are met, resulting in fire growth and spread through adjacent vegetation.

Wildland fires are either ignited by lightning or by some consequence of human activity. **In Colorado, lightning accounts for only 17 percent of wildfires, with human ignitions accounting for the remainder.**[37] Human causes vary and can include escaped debris pile burning, campfires, fireworks, construction sparks, downed transmission lines, and arson.

Wildland fires can occur during any time of year. Although there are frequent references to a "fire season," ignitions are a result of the ability of fuels to support combustion. In addition to an ignition source, the fuel type, amount of fuel, distribution pattern, and moisture content—coupled with weather and topography—will determine the conditions for combustion and resulting fire behavior. Fire behavior "outputs" include intensity,

Applicable Planning Tools and Strategies

Addressing Hazards in Plans and Policies

- Comprehensive Plans
- Climate plan
- Community Wildfire Protection Plan
- Hazard mitigation plan
- Parks and open space plan
- Response and recovery planning

Strengthening Incentives

- Development agreements
- Transfer of development rights and density bonuses

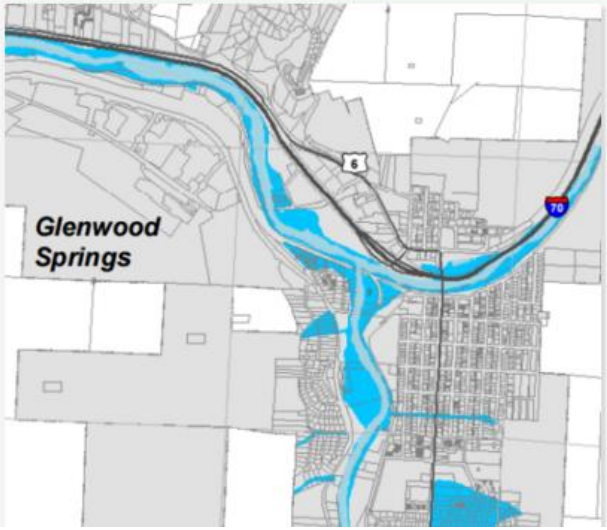
Protecting Sensitive Areas

- 1041 Regulations
- Cluster subdivisions
- Conservation easements
- Land acquisition
- Overlay zoning

Land Use Tool: Overlay Zoning

On This Page

How It Works



Overlay zoning is used by communities to appl area-specific standards and/or conditi zoning district (such as residential or m d-use) determines the types of uses permitted, the dimensional requirements, and sometimes additional district-specific standards. An overlay district (or overlay zone) is an additional layer of standards that apply to all areas within a defined overlay boundary, regardless of the underlying base zoning district. For example, an area with single-family homes that is zoned R-1 might also be within a hillside overlay zone. In this example, the permitted uses might allow construction of a single-family home according to the R-1 standards;

Model Codes & Regulations

Learn More

Hazards Addressed

Flood

Wildfire

PDF

Download PDF

See all PDFs

Key Facts

Administrative Capacity - Experienced planner

Mapping - Technical mapping typically required

Moving Forward/Next Steps

Next Steps

- Website goes live in March
  - Sign up for updates here: www.planningforhazards.com
- Attend a training
  - RMLUI Conference, March 10, etc.
  - Webinar in April
- Have a need for training/technical assistance?
  - Contact anne.miller@state.co.us
- Send best practices to andrew.rumbach@ucdenver.edu

Questions & Discussion

- What are the most effective ways to educate and engage communities through Colorado?
- What resources and information do communities need to be successful?

THANK YOU!

PLANNING FOR HAZARDS
Land Use Solutions for Colorado

Questions? Please contact Anne Miller: anne.miller@state.co.us