Flood

in the Intermountain Southwest

Hardly a year goes by in the Intermountain Southwest without a flood somewhere in the region. By virtue of its geography, the northern part of the region is prone to spring snowmelt floods, the southern part of the region suffers frequent summer monsoon flash floods, and the entire region is affected by the oddball tropical storm that whisks in colossal amounts of warm, moist air and can wreak havoc in spring, summer, or fall.

In a physical sense, floods occur at the intersection of precipitation, topography, and geology. Floods and their impacts have been augmented by land use changes, including increased paved areas that decrease infiltration of precipitation into the soil and accelerate runoff, an increase in severe wildfire which destabilizes soils and contributes ash and debris to runoff and streamflows, and public policy which affects society's ability to adequately monitor weather and stream conditions and has implications for our ability to prepare for floods.

Western Adaptation Alliance cities have a long history of public policies and practices to prepare for floods. Some high-profile floods in recent years, fueled by record amounts of moisture, and sometimes amplified by post-fire ash and debris, have prompted cities to note their successes and redouble their efforts to protect lives and property.

KEY MESSAGES:

- Floods regularly impact roads, bridges, and buildings in the Intermountain Southwest, costing hundreds of millions of dollars and the loss of lives.
- Population growth, severe wildfires, and increasing temperatures---which more rapidly melt snow and cause the atmosphere to hold more moisture---have increased flood risk.
- Proactive flood management planning by Western Adaptation Alliance (WAA) communities will save lives and money.

TOP 5 MOST COSTLY FLOOD EVENTS

	Cost (millions $)	City	Date
1	530	Denver	June, 1965
2	400+	Flagstaff	January, 1993
3	400	Phoenix	January, 1993
4	300+	Boulder County	September, 2013
5	300	El Paso	August, 2006
Total	$1.93 BILLION		

Three-years after the Aspen Fire (2003), debris flows severely damaged the Sabino Canyon Recreational Area in Tucson, AZ. Credit: Chris Magril, USGS.

Middle right: Boulder Creek under Broadway, 2013, © Bruce H. Raup. Bottom right: post-fire debris flow severely damaged a local recreational area in Tucson, 2006, Chris Magril/USGS.

Acknowledgements: Funding by Urban Sustainability Directors Network. Narrative created by The University of Arizona and the Western Adaptation Alliance.

FOCUS ON FLOOD IN (NAME YOUR CITY)

In Tucson…

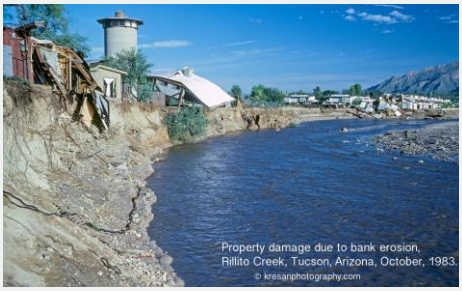

Photo: Property damage due to bank erosion, 1983. Credit: Peter Kresan

HEADING OFF THE FLOODWATERS

Floodplain management in Fort Collins. In 1980, the City of Fort Collins developed a separate stormwater utility, in conjunction with drainage basin master planning. Actions taken by the city, including regulation of development in the floodplain and an early warning system, reduced loss of lives and property damage during the El Niño-fueled 1997 flood. Since then, the city's floodplain management program—ranked one of the top programs in the nation—has helped reduce flood impacts, including during the 2013 storm.

Urban Planning in Tucson. The City of Tucson and the Pima County Flood Control District have joined forces to keep constant attention on flood risk. Learning big lessons from record flood damage associated with Tropical Storm Octave in 1983, their programs to maintain and reinforce stream banks have minimized erosion during extreme floods.

A green space buffer in Boulder. In 1984, Boulder created the Greenways Program, which combines recreational paths with flood mitigation and storm drainage improvements along the city's 15 major urban drainageways. While the city has invested more than $44 million dollars in flood mitigation, they've relied primarily on good land-use planning and stewardship of the environment to reduce flood risk. This combination, along with a forward-thinking emergency alert system and innovative programs to reduce property owners' flood insurance rates, helped residents and businesses quickly bounce back from the 2013 storm, which brought a year's worth of rain in just 8 days.

Voting for flood protection in Flagstaff. In 2012, 74% of voters in the City of Flagstaff approved a bond measure to fund $10 million in forest treatments, across 13,500 acres of land, to reduce the connected risks of high-intensity wildfire and post-fire flooding. Economic analyses project a ten-fold savings in the costs of projected post-fire flood damages, through the Flagstaff Watershed Protection Project.

WHAT'S NEXT

Intense flooding is a regular occurrence for the Southwest region and has already led to costly impacts for WAA cities. Knowing this, WAA cities have already taken action by implementing preventative measures aimed at reducing the impacts from extreme floods. These measures have been effective and have saved lives and millions of dollars in damages. However, the region is still vulnerable to these events, as seen most recently by the record-breaking precipitation and damage from the 2013 Colorado floods and the 2014 Phoenix floods. Further, as warmer temperatures cause snowmelt to occur earlier in the year and storms---including summer thunderstorms and tropical storms---to hold more moisture, planners anticipate more severe and more frequent flooding. Add to this the increase in severe fires with the potential for debris-laden post-fire flooding, and communities need even better flood planning and preparedness. WAA cities can build upon past successes to further increase resilience to future floods, through innovative land management, flood preparedness, and post-fire flood protection programs. With proactive planning, WAA cities can continue to reduce impacts from extreme floods, saving lives and money.

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