Saving Our Source

Forest Headwaters and Water Supply in a Changing Climate

Tony Dixon, USFS (Oct 2008)

National Forests

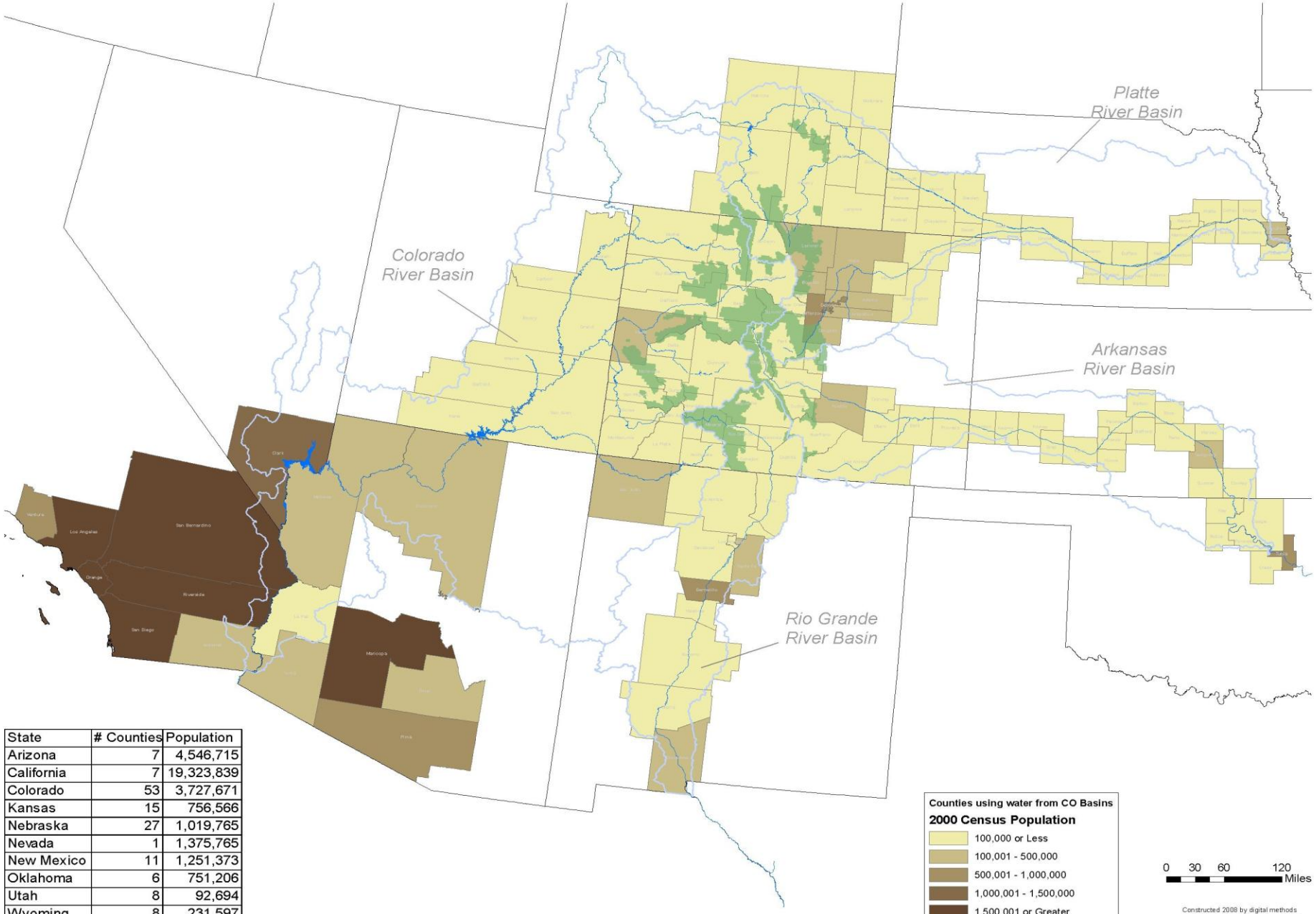
- Lower 48 states: 9% area, 18% water
- 11 western states: 19% area, 51% water
- Colorado: 22% area, 68% water

National Forests and Watersheds

- **Organic Act (1897):** "Secure favorable conditions of water flows"

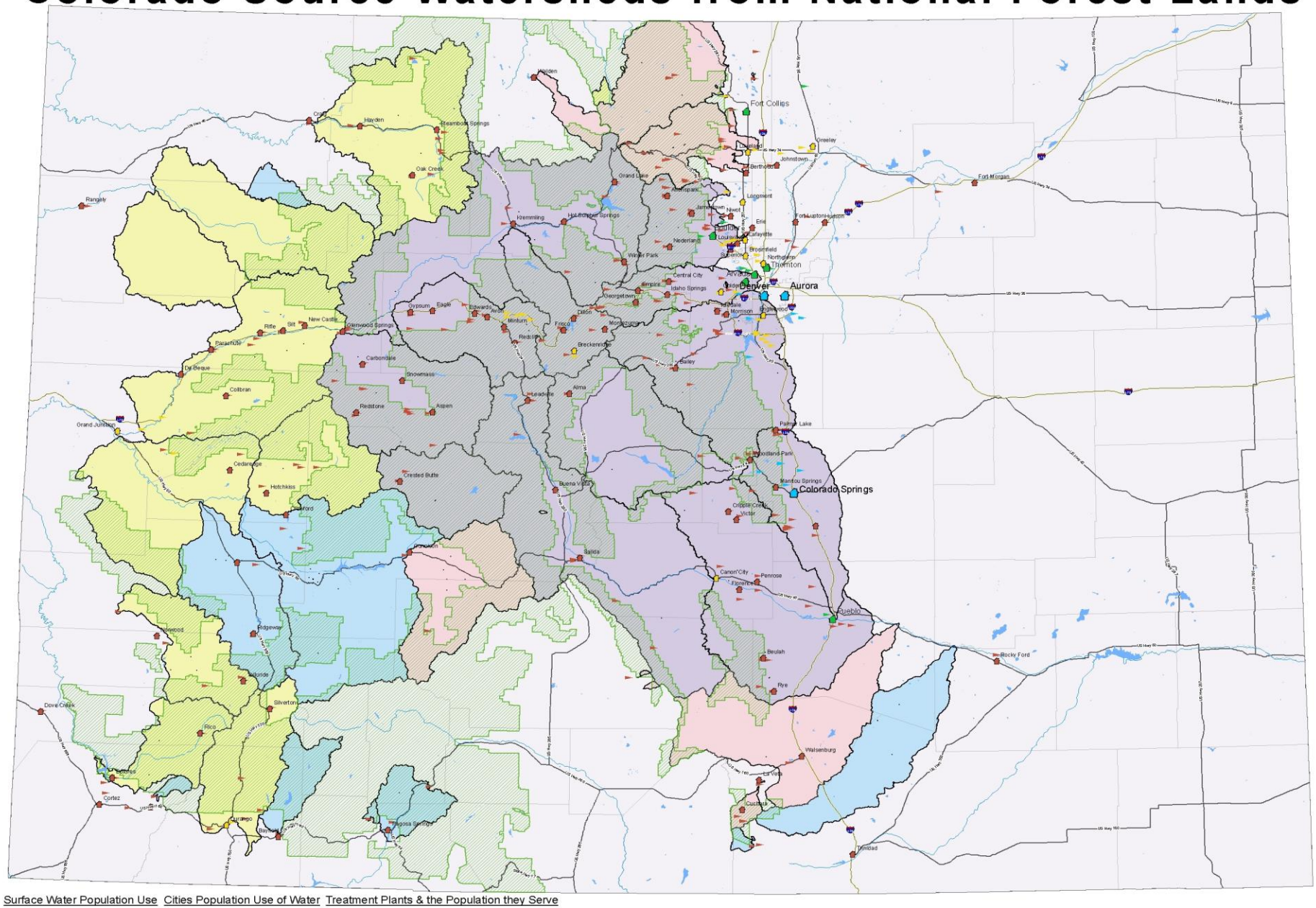
- **Gifford Pinchot (1910):** "The connection between forests and rivers is like that between father and son – no forests, no rivers."

Counties Depending on Water from CO National Forests



State	# Counties	Population
Arizona	7	4,546,715
California	7	19,323,839
Colorado	53	3,727,671
Kansas	15	756,566
Nebraska	27	1,019,765
Nevada	1	1,375,765
New Mexico	11	1,251,373
Oklahoma	6	751,206
Utah	8	92,694
Wyoming	8	231,597
Grand Total	143	33,077,191

Colorado Source Watersheds from National Forest Lands



Surface Water Population Use

- 75,000 or less
- 75,001 - 250,000
- 250,001 - 1,500,000
- 1,500,001 or more
- US National Forests

Cities Population Use of Water

- 20,000 or less
- 20,001 - 100,000
- 100,001 - 250,000
- 250,001 or greater

Treatment Plants & the Population they Serve

- 20,000 or less
- 20,001 - 100,000
- 100,001 - 250,000
- 250,001 or greater

The treatment plants shown only treat surface water derived from US National Forest Lands in the State of Colorado. Not all of these plants are tied to a city as there are treatment plants for unincorporated cities, water districts, ski areas, ranches, and other uses.

0 10 20 40 Miles

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Constructed 2008 by digital methods at the Rocky Mountain Regional Office, US Forest Service, Golden, Colorado using data from the Colorado Source Water Assessment and Protection program. Universal Transverse Mercator Projection Zone 13, 1983 North American Datum.


Photo courtesy of Sheryl Costello


Photo courtesy of Fred Patten


Photo courtesy of Fred Patten

Large Forest Fires (1000+ ac) (1988-2008)

- 4 times more fires burn 6 times more area
- Average time to control = 7.5 to 37 days
- Wildfire season = 78 days longer

Conserving Forest Headwaters

- Prepare for change
- Network knowledge
- Support entrepreneurial efforts
- Connect with the public and partners
- Increase watershed resilience

Increasing Watershed Resilience

- Fortify forests against severe wildfire damage
- Rebuild water storage capacity of wetlands
- Heal eroding lands and leaching mines
- Locate new reservoirs to meet ecological as well as human needs

Saving Our Source
Forest Headwaters and Water Supply in a Changing Climate

Tony Dixon, Deputy Regional Forester
U.S. Forest Service, Rocky Mountain Region

Abstract

Caring for our forest headwaters is a big factor in the complex equation of managing drought and climate risk. National forests (1) occupy nine percent of the lower 48 states but yield 18 percent of their water, (2) occupy 19 percent of the 11 western states but yield 51 percent of their water, and (3) occupy 22 percent of Colorado but yield 68% of its water

Most national forests were formed on lands that were severely abused in the late 1800s. They were proclaimed primarily to renew and sustain good watershed function for reliable supplies of clean water. For over 100 years, healthy forests have been seen as natural sponges that absorb, store, filter, and slowly release clean water to streams and aquifers.

National forests are the water towers of the West. People in 143 counties in 10 states depend on water flowing from the national forests of Colorado. National forests cover less than one-fourth of Colorado but supply over two-thirds of its water and over 70 percent of its surface public water supply systems. Most national forests in Colorado lie in source watersheds for surface public water supplies. Over 40 percent of Colorado's 65 imperiled wildlife species require aquatic and riparian habitats that are sustained by water flowing from national forest watersheds.

Climate change is altering the hydrology of mountain forests. Snow packs are declining, glaciers are retreating, spring snow melt is coming earlier, rain storms are more intense, floods are more severe, summer flows are lower, and droughts are more frequent and severe. Climate change is also a big factor in pine beetle epidemics in Colorado and western North America as sustained cold winter nights no longer prevail to keep beetle populations in check.

Climate change and forest conditions (over-crowded ponderosa pine forests and vast tracts of mature, even-aged lodgepole pine forests) have combined to increase hazards of severe wildfires to watershed function and water supplies. Over the past 20 years in the West, large forest fires (over 1,000 acres in size) are four times more common and burn six times more area, they take five times longer to control, and wildfire seasons average 78 days longer.

To care for our water supply in an era of climate change and drought, we must focus on water conservation, recycling, storage, and transport – but saving the source in the forest headwaters should also be part of the solution. Adapting to climate change requires us to address every factor of demand and supply – in the mountain forests, it requires flexible watershed stewardship strategies in five areas:

- Preparing for change through assessments that identify watersheds where water supply is most vulnerable to severe wildfires and where degraded ecosystems need to be healed;

- Networking knowledge about the effects of climate change on watershed function and the effectiveness of forest watershed treatments;

- Supporting entrepreneurial efforts of new businesses interested in ecosystem markets that meet conservation goals, like the new wood pellet plant in Kremmling;

- Connecting with the public and partners to build citizen awareness and support and explore new resources to get work done on the ground;

- Increasing watershed resilience in forest headwaters so the soil holds and filters the most water as long and effectively as possible to yield optimum supplies of clean water. This action has four elements:

    - Fortify forests against severe wildfire damage by renewing stand structures better adapted to natural wildfire patterns in strategic areas. In ponderosa pine forests, we need to restore open stands of well-spaced trees. In lodgepole pine forests, we need to create diverse patches with varying species and age classes.

    - Rebuild the water storage capacity of wetlands by restoring their soil matrix and let them once again store vast amounts of water naturally.

    - Heal eroding roads and trails, bare stream banks, and abandoned mines to increase our available clean water supply.

    - Locate new reservoirs to meet ecological as well as human needs by protecting and connecting habitats of native species like cutthroat trout.

The U.S. Forest Service recognizes that water is a key conservation issue for this new century. Climate change and water are two of our top national priorities. In our region, forest and grassland health, water, and recreation are our top management emphases. We are focusing our budgets, work plans, and project priorities to give special attention to these resource areas.

Any solution to drought and climate change must include the forest headwaters to hit the mark. The U.S. Forest Service takes its role as a forest and water steward to heart and has special expertise in how to manage the complex variety of forest types to benefit water supply. We are poised to shift into higher gear and eager to work with others to care for our forest headwaters and help sustain our future clean water supplies.

Antoine “Tony” Dixon
Deputy Regional Forester

U.S. Forest Service
Rocky Mountain Region
Golden, Colorado

Antoine “Tony” Dixon became Deputy Regional Forester of the Rocky Mountain Region in June 2008 having responsibility for assisting Regional Forester Rick Cables manage resources on the 22 million acres of National Forests and Grasslands in Colorado, Wyoming, Nebraska, South Dakota and Kansas.

Dixon, an 18-year employee of the US Forest Service, was most recently Forest Supervisor of the National Forests in Mississippi, headquartered in Jackson.

Dixon launched his agency career as a Public Affairs Specialist on the Routt National Forest in Colorado. He also worked as a Public Affairs Specialist in the Rocky Mountain Regional Office in Golden, CO. During much of his career, however, he has been in the southeast, where he served as the Deputy Regional Director of Public Affairs and as the Freedom of Information Act Coordinator in the Atlanta-based southern region headquarters. He served as a Program Analyst, Legislative Affairs Specialist, Deputy Area Budget Coordinator, and Special Assistant to the Deputy Chief of the National Forest System in the agency’s Washington Office. He was also an Acting Forest Supervisor for the National Forests in Alabama.

Dixon has a bachelor’s degree in marketing and forestry from Alabama A&M University and a master’s degree in administration from Central Michigan University. In 2004, he was also a Senior Executive Fellow at the John F. Kennedy School of Government, Harvard University. In 2007, he was selected as a candidate for the Senior Executive Service Development Program.

Dixon is a member of the Society of American Foresters and Omega Psi Phi Fraternity, Inc.

Dixon enjoys snowboarding and golfing. Tony and his wife, Tammi, have one son.