Western Water Law and Colorado’s Water Situation

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CMG Garden Notes #261  |  Whiting (2012) Unit L Chap. 47
Why such a big deal?

Ban repealed: Residential rain barrels now legal in Colorado

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DENVER — After years of debate,
legislators have finally made rain barrels
legal in Colorado.

Governor John Hickenlooper signed a bill
into effect Thursday that legalized the use
of residential rain barrels in the state.

Hickenlooper signs rain barrel legalization bill into law. (Photo: Conservation Colorado)
Let’s take a step back in time

How did all of this start?
Frontier justice was rough and subject to the law of force.

“We have it Rich.” - Washing and panning gold, Rockerville, Dak. Old timers, Spriggs, Lamb and Dillon at work. Photo and copyright by Crabbill, 1889.
Colorado Water Law History

- The legal validity of the practice of appropriating water by diversion was confirmed by the Colorado Supreme Court in the leading case of *Coffin v. Left Hand Ditch Co.* 6 Colo. 443 (1882)
“Newcomers understood – voluntarily or by force – that their need for water would not be filled until everyone who had arrived before them was satisfied.”

“… represented the birth of the American system of prior appropriation.”
Prior Appropriation

- The basic tenant of Colorado water rights
  First in time = first in right.

- An appropriation is made when an individual physically takes the water from a stream and transports it to another locale for beneficial use.
Terminology

- **Appropriation** is the application of a specified portion of the waters of the state to a beneficial use pursuant to the procedures prescribed by law. CRS 37-92-103(3)

- **Beneficial use** is the use of that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made. CRS 37-92-103(4)
Usufruct Rights

- Has a different meaning than a “property right”
  - Usufruct (u·su·fruct): the right to enjoy the use and advantages of another's property short of the destruction or waste of its substance

- Cannot be “owned” but a “right to use” the flowing water may be developed

- Based on continued application to beneficial use
Prior Appropriation

- In practice, “first in time; first in right” means: Those who were first to appropriate water and apply that water to a beneficial use established their priority.

If there is not enough water to satisfy all water rights, a “priority list” goes into effect.

- Early water rights are “senior” and later water rights are “junior.”
Priority of a Water Right

- In order to establish a priority on the priority list one must:
  - divert water and put it to beneficial use
  - and receive a court decree verifying their “priority status”

- A priority date is established by the date the water was first appropriated (put to a beneficial use)
Priority Date

- The **date of appropriation** specifies is the date that specific steps were taken to put the water to beneficial use (initiation of construction). It is used in determining a water right’s priority date and its administration number.

- The **date of adjudication** specifies when the existence of a water right is confirmed by court decree, signifying that the water right has gone through the judicial process.
Adjudication Date

Water rights must be adjudicated – or be “court approved”

- The date of adjudication specifies when the water right is “filed upon” and the existence of the right is confirmed by court decree, signifying that the right has gone through judicial process.

- Water rights exist by decree – describes the amount, priority date, other attributes of the water right.
Priority Administration

- Senior water rights holders must be satisfied before any other junior rights are satisfied.
- Priority is applied in relation to other water rights deriving their supply of water from a common source.
- Primarily organized by watershed (also called divisions) in Colorado.
- Many rivers in Colorado are “over appropriated”.
Priority Administration (cont.)

- The process of allocating water to various water users is "Water Rights Administration", and is the responsibility of the Division of Water Resources (http://water.state.co.us)

- In 1879, Colorado established Water Commissioners to distribute water rights in priority based upon the principle of “First in Time... First in Right”.

Water Providers in the Grand Valley

Establish the district you reside in and click on the corresponding link to visit that providers page.

Legend
- County Roads
- Irrigation Districts
  - Grand Valley Irrigation Company
  - Grand Valley Water Users Association
  - Palisade Irrigation District
  - Orchard Mesa Irrigation District
  - Redlands Water & Power
  - Mesa County Irrigation District
Water Available to My Property

- Real estate postings often describe parcels as having attached water shares or irrigated acreage.
- Most of the time, these posting refer to direct flow rights.
  - Pertain to water diverted from a canal, ditch or stream using a lateral ditch or pipeline.
Allotment Contracts vs Water Shares

- The most common legal instruments used to allocate water rights are **allotment contracts** and **water shares**
Allotment Contracts

- Water allotment contracts are used by irrigation districts, water conservation districts and water conservancy districts.
- Within the delineated boundaries of the district, water rights are held at the corporate level.
- Water rights are not held by individual landowners.
- Water is attached to the land and cannot be changed to another use outside of the district.
Water Shares

- Water shares are used by mutual ditch, canal or reservoir companies or “nonprofit community enterprises”
- Water shares are essentially company stock certificates that convey access to a water right.
- Priority dates are appropriated to the ditch, canal or reservoir controlled by the company.
  - Water may still be allocated on a rotational basis depending on availability at particular times of the year.
Colorado Miner’s Inch

- Quantity of water that will escape from an aperture one inch through a two inch thick plank, with a steady flow of water standing six inches above the top of the escape aperture, the quantity so discharged amounting to 2274 cubic feet in 24 hours.
Colorado Miner’s Inch (cont)

- Exact flow rate amounts to 1.56 cubic feet of water per minute or also 1/38 cfs or 11.69 gallons per minute.

- In irrigation vernacular, 1/38 cfs can be thought of as the amount of water flowing through 1-¼ siphon tube with about 5 inches of drop.

- Flowing 24/7 for an entire irrigation season, 1/38 cfs can add up to a lot of water!
Colorado Miner’s Inch (cont)

- Many Colorado Water Rights are still based on this obscure unit.
- Palisade Irrigation District parcels are allocated a proportional amount of the District’s water right. Each parcel is allocated 1/3 to 1/2 of a Colorado miner’s inch per acre depending on water availability.
River Call

- A call may occur because a water right holder is not receiving all the water they are entitled to by decree, so they request that the Division Engineer shut down (curtail) all upstream water rights junior to them until their senior right is satisfied.

- A call may be set by the water commissioner to communicate the level of demand on the available supply of natural stream flow.
Transferability Principles

Water rights can be separated and sold.

- A water right can be sold to a third party.
  - The new owner of the water right enjoys the same priority of the previous owner.
- Direct flow surface water, tributary groundwater, and storage rights are different.
- Water rights may be used in locations distant from the stream, such as another location or another basin.
Anti-Speculation Principles

Affirms the nature of waters in the West.

- Ensures that water will be devoted to beneficial uses.
- Prevents individuals from monopolizing water solely for financial gain.
Colorado River Water Situation

see www.cfwe.org

Fall 2015 issue of Headwaters
Colorado River Compact of 1922

- Colorado, like all Upper Division states, shares obligations to the Lower Division.

- The Upper Division shall “not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any ten consecutive years.”

- Colorado River Compact of 1922. Section III (d)
Colorado River Allocations

**UPPER BASIN - 7.5 MAF**
Upper Basin Allocations
Established by Upper Colorado Basin Compact - 1948

**LOWER BASIN - 7.5 MAF**
California - 4.4 MAF
Arizona - 2.8 MAF
Nevada - 0.3 MAF
Lower Basin Allocations Established by the Boulder Canyon Project Act - 1928

Mexico - 1.5 MAF
Established by Treaty with Mexico - 1944
Historical Supply and Use and Projected Future Colorado River Basin Water Supply and Demand

Historical Supply and Use

Water Supply
(10-year Running Average)

Water Use
(10-year Running Average)

Projected Future Supply and Demand

Projected Demand

Projected Water Supply
(10-year Running Average)

Preliminary Results

Year

Volume - Million Acre-feet

25
20
15
10
5
0
Lake Powell and Drought

April 20, 2012

April 26, 2013
Lake Powell Water Surface Elevation

Lake Powell - Monthly Data

Top of Active Storage (3700.0 ft.)

Elevation (feet)  Top of Active Storage

Period of Record

CSU Extension Master Gardeners Apprentice Program | January 31, 2019 | Grand Junction, CO
Lake Powell End of Month Elevations

Historic and Projected based on February 2017 Modeling

- **Equalization Tier**: 3,651'
- **Upper Elevation Balancing Tier**: 3,575'
- **Mid-Elevation Release Tier**: 3,575'
- **Lower Elevation Balancing Tier**: 3,525'
- **Minimum Power Pool**: 3,490'

- **Observed**
- **February 2017 Most Probable**
- **January 2017 Min Probable**
- **January 2017 Max Probable**

Date: Jan-16 to Sep-18
Lake Powell Unregulated Inflow
Water Year 2019 Forecast (issued January 1)
Comparison with History

Water Year 2019 Forecast
- Jan Most Prob: 6.98 maf (64%)
- Jan Min Prob: 4.81 maf (44%)
- Jan Max Prob: 10.38 maf (96%)

Average: 10.83 maf (1981-2010)
The water year 2015 unregulated inflow to Lake Powell was 9.0 MAF.
## Lake Powell and Lake Mead

<table>
<thead>
<tr>
<th>Lake Powell Elevation (feet)</th>
<th>Lake Powell Operational Tiers</th>
<th>Lake Powell Storage (maf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,700</td>
<td>Equalization Tier</td>
<td>24.3</td>
</tr>
<tr>
<td>3,595</td>
<td>Upper Elevation Balancing Tier¹</td>
<td>11.3</td>
</tr>
<tr>
<td>3,575</td>
<td>Release 8.23 maf; if Lake Mead &lt; 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf</td>
<td>9.5</td>
</tr>
<tr>
<td>3,560</td>
<td>Mid-Elevation Release Tier</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td>Release 7.48 maf; if Lake Mead &lt; 1,025 feet, release 8.23 maf</td>
<td>5.9</td>
</tr>
<tr>
<td>3,525</td>
<td>Lower Elevation Balancing Tier</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>Balance contents with a min/max release of 7.0 and 9.5 maf</td>
<td>0</td>
</tr>
<tr>
<td>3,370</td>
<td></td>
<td>895</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lake Mead Elevation (feet)</th>
<th>Lake Mead</th>
<th>Lake Mead Storage (maf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,220</td>
<td>Flood Control or 70R Surplus</td>
<td>25.9</td>
</tr>
<tr>
<td>1,200</td>
<td></td>
<td>22.9</td>
</tr>
<tr>
<td>1,145</td>
<td>Domestic Surplus</td>
<td>15.9</td>
</tr>
<tr>
<td>1,125</td>
<td>Normal Operations</td>
<td>13.9</td>
</tr>
<tr>
<td>1,100</td>
<td></td>
<td>11.5</td>
</tr>
<tr>
<td>1,075</td>
<td>Shortage 333 kaf²</td>
<td>9.4</td>
</tr>
<tr>
<td>1,050</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>1,025</td>
<td>Shortage 417kaf⁴</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,000</td>
<td>Shortage 500 kaf² and Consultation³</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
… so far

Colorado has been meeting its obligations to the Compact.

Water demands across all sectors keep putting more pressure on water supplies
Colorado Water Supply Gap

- Yampa/White/Green
- North Platte
- South Platte
- Identified Projects: 404,300 AF
- Gap: 107,800 AF
- 107,600 AF
- 10,300 AF

CSU Extension Master Gardeners Apprentice Program | January 31, 2019 | Grand Junction, CO
Colorado Long-Term Water Planning

- **2050 Gap Water Needs High Projection**
- **2050 Water Needs Medium Projection**
- **2050 Water Needs Low Projection**

**Identified Projects and Process if 100% Successful**

**Existing Water Use and Systems**
Historic Annual Average Streamflow

Prepared by the Hydrographic Branch (2003 Revision)
Historic averages obtained from USGS Water-Data Report CO-02

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES
TRANSMOUNTAIN DIVERSIONS
OFFICE OF THE STATE ENGINEER

TO COLORADO RIVER BASIN
40. DIVIDE HIGHLINE FEEDER DITCH
41. SARVIS DITCH
42. STILLWATER DITCH
43. DOME DITCH
44. REDLANDS POWER CANAL

TO SOUTH PLATTE BASIN
1. WILSON SUPPLY DITCH
2. DEADMAN DITCH
3. BOB CREEK DITCH
4. COLUMBINE DITCH
5. LARAMIE Poudre TUNNEL
6. SKYLINE DITCH
7. CAMERON PASS DITCH
8. MICHIGAN DITCH
9. GRAND RIVER DITCH
10. ALVA B. ADAMS TUNNEL
11. MOFFAT WATER TUNNEL
12. BERTHOUD PASS DITCH
13. STRAIGHT CREEK TUNNEL
14. VIDLER TUNNEL
15. HAROLD D. ROBERTS TUNNEL
16. BOREAS PASS DITCH
17. HOOSIER PASS TUNNEL

TO GUNNISON RIVER BASIN
35. RED MOUNTAIN DITCH
37. CARBON LAKE DITCH
30. MINERAL POINT DITCH
30. LEON TUNNEL

TO ARKANSAS BASIN
16. COLUMBINE DITCH
19. EWING DITCH
20. WURTZ DITCH
21. HOMESTAKE TUNNEL
22. CHARLES H. BOULSTRA TUNNEL
23. BUSK-IVANHOE TUNNEL
24. TWIN LAKES TUNNEL
25. LARKSPUR DITCH
26. HUDSON BRANCH DITCH
27. MEDANO PASS DITCH

TO RIO GRANDE BASIN
28. TARGELL DITCH
29. TABOR DITCH
30. WEMINUCHE PASS DITCH
31. PINE RIVER-WEMINUCHE PASS DITCH
32. WILLIAMS CREEK-SQUAW PASS DITCH
33. DON LA FONT DITCHES 1 & 2
34. TREASURE PASS DITCH
35. SAN JUAN-CHAMA PROJECT

Updated September 2003
Governor Hickenlooper

- The governor has spoken about Colorado’s water supply challenges.
- “Every discussion about water should start with conservation.”

  State of the State Address. Denver, CO.
The Constitution of the State of Colorado

- “Priority of appropriation shall give the better right as between those using water for the same purposes; but when the waters of any natural stream are not sufficient for the service of all those desiring to use of the same …”

- … those using the water for domestic purposes shall have the preference over those claiming for any other purpose, and those using the water for agricultural purposes shall have preference over those using the same for manufacturing. (Section 6, Article XVI)
## Urban Water Use

### Western Slope Non-Agricultural Post-Compact Use

<table>
<thead>
<tr>
<th>Description</th>
<th>Annual Water Use (AFY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Indoor</td>
<td>1,390</td>
</tr>
<tr>
<td>Residential Outdoor</td>
<td>16,675</td>
</tr>
<tr>
<td>Commercial/Industrial</td>
<td>4,210</td>
</tr>
<tr>
<td>Self-Supplied Industrial (e.g. Power Generation)</td>
<td>32,940</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>55,215</strong></td>
</tr>
</tbody>
</table>

AFY – Acre-Feet per Year (1 AF = 325,851 gallons)
## Homeowner Indoor and Outdoor Water Use

<table>
<thead>
<tr>
<th>Area</th>
<th>Activity</th>
<th># of times</th>
<th>Circumstances</th>
<th>Water Used Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BATHROOM</strong></td>
<td>Toilet</td>
<td>4 flushes/day</td>
<td>Conventional toilet</td>
<td>3.5 - 7.0 gal/flush</td>
</tr>
<tr>
<td></td>
<td>ULV toilet</td>
<td></td>
<td>1.6 gal/flush</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shower</td>
<td>5 min. once/day</td>
<td>Conventional showerhead</td>
<td>3-8 gal/minute</td>
</tr>
<tr>
<td></td>
<td>Bath</td>
<td>once/day</td>
<td>Low-flow showerhead</td>
<td>2.5 gal/minute</td>
</tr>
<tr>
<td></td>
<td>Tub</td>
<td></td>
<td>Full tub</td>
<td>30-45 gal</td>
</tr>
<tr>
<td></td>
<td>Tub ¼ to ½ full</td>
<td></td>
<td>Tub ¼ to ½ full</td>
<td>9-12 gal</td>
</tr>
<tr>
<td></td>
<td>Shaving</td>
<td>once/day</td>
<td>Open tap</td>
<td>5-10 gal</td>
</tr>
<tr>
<td></td>
<td>Brushing teeth</td>
<td>twice/day</td>
<td>One full basin of water</td>
<td>1 gal</td>
</tr>
<tr>
<td></td>
<td>Hand washing</td>
<td>4 times/day</td>
<td>Open tap</td>
<td>2-5 gal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Brush and then rinse</td>
<td>½ to ¾ gal</td>
</tr>
<tr>
<td><strong>KITCHEN</strong></td>
<td>Cooking</td>
<td>Washing produce</td>
<td>Open tap</td>
<td>5-10 gal</td>
</tr>
<tr>
<td></td>
<td>Dishwasher</td>
<td>once/day</td>
<td>One full kitchen basin</td>
<td>1-2 gal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>once/day full load</td>
<td>Standard cycle</td>
<td>10-15 gal</td>
</tr>
<tr>
<td></td>
<td>Dishwashing by hand</td>
<td>once/day</td>
<td>Short cycle</td>
<td>8-13 gal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Open tap</td>
<td>30 gal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Full basin/wash and rinse</td>
<td>5 gal</td>
</tr>
<tr>
<td></td>
<td>Laundry</td>
<td>once every 3 days</td>
<td>Conventional top-loader</td>
<td>35-50 gal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Front-loader</td>
<td>18-20 gal</td>
</tr>
<tr>
<td><strong>MISC.</strong></td>
<td>Car washing</td>
<td>twice/month</td>
<td>Hose w/shut-off nozzle</td>
<td>50 gal/wash</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 full, 2 gal. buckets</td>
<td>10 gal/wash</td>
</tr>
<tr>
<td><strong>LAWNCARE</strong></td>
<td>Kentucky bluegrass</td>
<td>½&quot; every third day</td>
<td>5000 sq. ft.</td>
<td>1,500 gal/watering</td>
</tr>
<tr>
<td></td>
<td>Turf-type tall fescue</td>
<td>½&quot; twice/week</td>
<td>5000 sq. ft.</td>
<td>1,500 gal/watering</td>
</tr>
<tr>
<td></td>
<td>Buffalograss</td>
<td>½&quot; every 2 weeks</td>
<td>5000 sq. ft.</td>
<td>1,500 gal/watering</td>
</tr>
</tbody>
</table>
Landscape and Lawn Watering

- Urban lawn watering is the single largest water demand on most municipal supplies.
- There are many ways to conserve water on the home landscape.
Rain Barrels

- Simple way to be more efficient with the water raining on your property.
Roof Drainage Area Needed to Fill Rain Barrel

- Roof Size for 55 Gallon Collection
- Roof Size for 110 Gallon Collection

Rainfall (in)

Roof Drainage Area (Sq ft)
Rain Barrels (cont)

- [http://stormwatercenter.colostate.edu/rain-barrels/](http://stormwatercenter.colostate.edu/rain-barrels/)

- Vegetable Garden (¼ inch/day or 3½ inch/week)
  - 1 inch per water application
  - 110 gallons (0.134 ft³)/gallon = 14.7 ft³
  - 14.7 ft³/3.5 inch * 1 inch/0.08 ft = 53 ft²
  - Approximately 7ft by 7ft garden