Water

Colorado's Most Valuable Natural Resource

In our efforts to develop our natural environment, water is probably our most valuable natural resource. It is regularly replenished and provides man with unlimited ways to participate in conserving and creating expanded uses that enhance "quality of life", not only for man, but all of nature.

Nature provides a fresh supply of water to Colorado every year, mostly in the form of winter snowpack.

During the sometimes all-too-brief period of Spring snowmelt, the network of streams and rivers quickly moves water from our high areas, across the plains and out to neighboring states. The water in Colorado's rivers and streams is subject to appropriation and use in accordance with State Water Law and Interstate Compact Agreements.

The history of Colorado's economy has been closely tied to water resource management. As population increases and planning for land use and economic development becomes more complex, the management of water and water issues becomes even more important.

Supply is finite. Demand is growing.
So conservation becomes essential.

Hydrogeology of the San Luis Valley

An aquifer contains enough saturated permeable material to produce significant amounts of water for wells and springs. The San Luis Valley includes two types of aquifers.

The uppermost aquifer is called the unconfined aquifer and occurs almost everywhere in the Valley. The depth to this water for most of the valley is 15 feet or less. However, the depth can reach 300 feet along the edges and in most of Costilla County. The thickness of the unconfined aquifer is 50 to 130 feet depending on the location.

The lower aquifer is called the confined aquifer. Lenses of clay and lava beds confine and separate it from the unconfined aquifer. The clay lenses are not one continuous layer, but are separate and overlapping in places. Water inflow below the clay lenses at higher elevation near the edge of the Valley gives the confined aquifer a greater pressure, resulting in artesian flow.

Closed Basin Project

Half of the San Luis Valley lies north of the Rio Grande, has no natural surface or shallow groundwater outlet, and is referred to as the closed basin. The Rio Grande headwaters and its tributaries drain the remainder of the Valley. Most of the streamflow is derived from snowmelt in the 4,700 square miles of watershed in the surrounding mountains.

The closed basin encompasses 2,940 square miles of watershed north of the Rio Grande, of which Saguache County is a part. Water in the basin does not flow out because of a surface and shallow groundwater divide. The surface divide is a natural topographic feature. The associated groundwater divide moves due to canal leakage and applied irrigation water. Groundwater south of the divide moves toward the Rio Grande and water north of the divide flows into the Closed Basin.

The Closed Basin Project was designed to reduce non-beneficial evapotranspiration and convey the resulting water to the Rio Grande. Research and engineering investigations in to the conditions of the Closed Basin began in 1940. Congressional approval for construction of the Closed Basin Project occurred in 1972, with all phases competed in 1993.

A series of wells pumps water into pipeline laterals, connected to a 42-mile conveyance channel that delivers the water to the Rio Grande. The salvaged water assists Colorado in meeting its obligation pursuant to the Rio Grande Compact. The project also delivers mitigation water to the Alamosa National Wildlife Refuge, Blanca Wetlands and San Luis Lake.

Water Rights

Colorado was the first state to include the Doctrine of Prior Appropriation in its state constitution in 1876. Legal ownership of water rights is central

Water Rights, Continued -

to the Colorado version of the doctrine. A water right is based on diverting a given quantity of water at a specified site under a specified priority and applying the diverted water at an identified location for a defined purpose. Individuals and groups can own water rights, including municipalities, ditch companies and government agencies.

To establish or appropriate a water right in Colorado, water must be used for beneficial purposes. In order to initiate an appropriation in Colorado, the use must first show intent to divert water, place the water to beneficial use, and demonstrate the intent to divert in an open physical manner. It is advisable to file a water right application with the court in the basin in which the diversion is proposed, to verify your place in line within the priority system. Forms for water right applications can be obtained from the water court.

Water rights in Colorado are decided by the Colorado judicial system and administered by the State Engineer. A district court judge is designated as a water judge in each of the state's seven water divisions with jurisdiction to preside over matters in the division water court. The water courts determine water right quantities, priorities, changes, and claims, issuing legal decrees for water use. The State Engineer administers and distributes the water of the state, pursuant to these decrees. Division 3 encompasses the Rio Grande basin in Colorado. The Division has eight districts, each containing significant water drainage.

Rio Grande River Basin, Water Court
Water Division No. 3
702 4th St., Alamosa, CO 81101
719 589-9107

The principles of the Prior Appropriation Doctrine applied first to surface waters, but not to groundwater. Understanding the relationship between surface water and groundwater was limited until the 1900s. Recent Colorado legislation has developed a highly structured system of managing groundwater. Where groundwater use is determined to have an impact on appropriated surface stream flows, the groundwater and the associated surface stream flows are administered jointly as one stream system, using court approved rules and regulations.

Water rights are quantified, based on the rate of diversion (cubic feet per second) or volume stored (acre feet). The amount of water yielded from a water right is affected by the availability of water in any given year. If the water supply is limited, the holder of a junior priority water right may not receive the quantity decreed for the given year. The value of a water right depends on its priority.

Water rights may be transferred or changed, subject to certain procedures and restrictions imposed by the water courts and State Engineer. The quantity of water that can be transferred is generally based on the amount of water beneficially consumed.

Water conservancy districts were authorized by the 1937 Water Conservancy Act as a legislative response to the need for water projects. Conservancy districts are political subdivisions with power to levy property taxes to build and maintain storage and distribution projects, contract with state and federal government, file or be subject to lawsuits, and lease or sell water.

Rio Grande Compact

In the late 1800s, a series of drought years resulted in severe water shortages to the farmers along the Rio Grande. The river did not supply sufficient water for their needs and the new network of canals in Colorado fell suspect.

The Republic of Mexico threatened to sue the United States for water needs from the Rio Grande. The U.S. Government responded by enacting the embargo of 1896, suspending all rights-of-way across Federal lands for use of water from the Rio Grande. Potential lawsuits also stopped development of reservoirs in the San Luis Valley. In the Treaty of 1906, the U.S. agreed to deliver a total of 60,000 acre feet of water annually to Mexico. Texas, New Mexico and Colorado conducted discussions on their respective water rights on the Rio Grande into the 1900s. Equitable distribution became a main issue by 1923.

The Rio Grande Compact seeks to maintain historic consumptive use as documented in the early 20th century. The terms of the Compact are flexible to allow for annual variations of water supply. States can accumulate a debt or credit.

Rio Grande Compact, Continued -

Colorado has difficulty meeting its delivery requirement in years when the river's flow is high. Debts have accumulated; therefore, spills from reservoirs are necessary.

Water Quality

Water quality of the Rio Grande is considered to be the highest of the drainages leaving Colorado. However, high levels of trace metals are found in some streams in the basin due to past mining activities and local geological conditions. One of the streams affected is in Saguache County: Kerber Creek and its tributaries.

Groundwater quality is generally good with poorer quality toward the central part of the Valley. Mineral concentration increases toward the lower area of the closed basin due to geological formations and greater evaporation from the shallow water table area.

High nitrate levels in the unconfined aquifer have been noted in various studies since the late 1960s. The suspected reason is leaching of inorganic fertilizer from intensive agriculture, influenced by the short growing season, limited crop selection, coarse soils and shallow water tables. This concern is associated with the agricultural area surrounding Center, Hooper and Mosca.

Pesticides pose a similar threat to the groundwater, but integrated pest management efforts limit the leaching potential. Recently, efforts by agriculture in groundwater monitoring and improving efficiency of fertilizer and irrigation practices have shown promise in lowering the nitrate concentrations.

Water Use

Water is important for various uses in the San Luis Valley, including domestic, recreation, wildlife, agriculture and mining. Most mining operations closed by the end of the 20th Century.

Domestic use includes, drinking water, small businesses and lawn/garden watering for individuals and communities. Over 95 % of domestic water use for the San Luis Valley's 45,000 residents is dependent on groundwater.

The Valley is endowed with over 230,000 acres of wetlands, the most extensive system in the Southern Rocky Mountains. Numerous species of water birds breed, raise their young, and migrate through the Valley. Artesian and surface flows combined with high alkaline soils in some parts of the Valley result in many unique wetlands. The Rocky Mountain population of Greater Sandhill Cranes depends on this critical spring and fall migration habitat. Approximately 22,200 acres of publicly owned wetlands exist, which are actively managed, primarily for the water birds. Wetland habitat on refuges and other managed areas depend upon irrigation and intensive management of water.

More than 40 geothermal artesian springs and wells exist in the Valley, with temperatures ranging from 72 to 120 degrees F. Aquaculture is becoming a successful enterprise, utilizing warm geothermal water.

Over 97 % of Valley water is used for agriculture. A sustained agricultural economy would not be possible without irrigation. The principal source of water for irrigation in the SLV between 1880 and 1950 was surface water. A large network of canals was built in 1880-90. The area around Mosca and Hooper became unfarmable in 1915 due to the rising water table from irrigation. Drainage systems constructed between 1911 and 1921 to reclaim waterlogged lands alleviated some of the problems but created waterlogging in other low areas. Approximately 7,000 miles of stream channels and ditches flow through the Valley.

Present irrigation practices in the Valley vary according to the water source, soil conditions, topography and types of crops grown. Traditional surface irrigation methods, as in flood or furrow irrigation, are used in areas that are supplied primarily by surface water. These areas include agricultural land near all stream systems in the Valley. Center-pivot sprinklers have been more prevalent since the early 1970s and rely upon a combination of surface and tributary groundwater supplies.

Discharge of water from the Valley averages about 2,100,000 acre feet per year by evapotranspiration. Groundwater withdrawal primarily occurs as discharge from pumping wells. The annual streamflow at the state line averages 325,000 acre feet and groundwater underground flow accounts for a small amount, currently estimated as 75,000 acre feet.

Water Conservation Practices

Water conservation today means storing, saving, reducing and recycling water.

The average daily water use is 50-200 gallons per person per day. You'd be surprised at how much water and money you can save. We must all do our part to use water wisely and insure an adequate water supply for ourselves and future generations.

For households it means:
If you have a lawn, chances are this is your biggest water usage. Typically, at least 50 % of water consumed by households is used outdoors. Inside your house, bathroom facilities claim nearly 75 % of the water used.

Evaporative coolers require a seasonal maintenance check-up. For more water efficient cooling, check your evaporative coolers annually.

When washing vehicles, use soap and water from a bucket. Use a hose with a shut-off nozzle for the final rinse.

Use a broom when cleaning your driveway. Adjust sprinklers so only the lawn is watered - not the house, sidewalk or street. Do not water on sunny days. Check and maintain your sprinkler system regularly. A heavy rain means you don't have to water at all. each the family how to turn off automatic sprinkler systems, in case a storm comes up during a sprinkling cycle.

Always water your lawn during the cool time of the day to minimize evaporation. Early morning is best, and the peak water consumption hours (4pm-9pm) should be avoided.

Minimize grass areas in your yard, because less grass means less water demand. Replace it with low-water-use landscaping.

Adjust your irrigation schedule to accommodate changes in seasonal water demand. Install an automatic timer.

Buy a rain gauge to determine how much rain or irrigation your land has received.

When mowing, raise the blade on your lawn mover to at least three inches high, or to its highest level. Closely cut grass makes the roots work harder, requiring more water.

For landscaping, use native or other low-water-use plants. Check with your local nursery for the best native or low-water-use trees, shrubs and plants.

Using a layer of mulch around plants reduces evaporation and promotes plant growth. Water retaining basins also allow water to be concentrated around the plants.

Use the principles of Xeriscape. This landscaping method uses native and drought-tolerant plants, mulch to hold in moisture, and grouping plants according to water and light needs. To find out more about Xeriscape, contact:

Water Information Program
P.O. Box 475, Durango, CO 81301
water@frontier.net

For farmers who irrigate, water conservation means:

increasing uniformity of application, thereby allowing less water to be used; improving application practices via surge valves, special nozzles on sprinkler systems, and soil moister sensors; lining diversion canals and ditches to minimize seepage and leaks; and using weather data to balance water applications with available soil moisture and crop water needs.

For municipalities, it means:

metering water; encouraging residents to install and use high efficiency plumbing fixtures and educating them about water saving habits; promoting installation and conversion of water efficient landscapes through a method called Xeriscape; and reducing peak demands to avoid the extra costs of investing in additional pumping and treatment plants.

For industry, it means:

reusing water used in manufacturing and cooling, and identifying other resource-conserving methods for production processes.

General ideas:

Support efforts and programs that create a concern for water conservation among tourists and visitors to our area.

Water Conservation Practices, Continued -

Encourage your friends and neighbors to be part of a water-conscious community.

Support projects that will lead to increased use of reclaimed waste water for irrigation and other uses.

Report all significant water losses to the property owner, local authorities or your water management district.

Encourage your employer, school system, and local government to promote water conservation in the workplace.

Be aware of and follow all water conservation and water shortage rules in effect in your community. Don't assume - even if you get your water from a private well - that you need not observe good water use rules. Every drop counts.

Plumbing Codes

(See also Resource Guide, Land Use - Septic Codes)

Colorado State Codes apply to all plumbing installed in buildings in Saguache County. A State Plumbing Permit is required, as is an inspection by the State-appointed Plumbing Inspector, to ensure compliance with the State's adopted plumbing codes. All new construction must have a plumbing permit and is subject to inspection by:

State Plumbing Inspector
1570 12th road, Alamosa, CO 81101
800 325-2824

Definitions of Water Terms

can be found at
http://www.waterinfo.org/terms.html

U.S. Department of the Interior Bureau of Reclamation

Projects and Recreation Opportunities

The Bureau of Reclamation:

- Manages, develops, and protects water and related resources in an environmentally and economically sound manner in the interest of the American public.
- Serves as the fifth largest electric utility in the 17 Western States and the nation's second largest wholesale water supplier, administering 348 reservoirs with a total storage capacity of 245 million acre feet.
- Operates 58 hydroelectric powerplants, averaging 42 billion kilo-watt-hours annually.
- Delivers 10 trillion gallons of water to more than31 million people each year.
- Provides 1 out of 5 western farmers with irrigation water for 10 million farmland acres that produce 60 % of the nations vegetables and 25 % of its fruits and nuts.
- Manages in partnership 308 recreation sites, visited by 90 million people a year.

Recreation sites near the SLV:

Pueblo Reservoir
Platoro Reservoir
Taylor Park Reservoir.

Benefits of Bureau of Reclamation Conservation Projects:

- Reduce Federal and water user costs
- Improve reliability of existing water supplies
- Postpone the need for new or expanded water supplies
- Reduce the impacts of drought
- Improve and protect surface and groundwater quality through the reduction of non-point and point sources of pollution
- Improve the economics of water supply and use
- Conserve energy
- May provide a source of water to meet growing water needs for economic growth and human consumption
- May improve instream flows for fisheries, wildlife, riparian habitat and recreation.

San Luis Valley Water Quality Demonstration Project

0881 N. Hwy 285, Monte Vista, CO 81144
719 852-0960

A cooperation of USDA, CSU Cooperative Extension, Consolidated Farm Service Agency and Natural Resources Conservation Service, the mission is to "promote the use of Best Management Practices (BMPs) to minimize agricultural non-point source pollution of water resources in the valley."

SLV Water Quality Demonstration Project, Continued -

Shallow water tables, coarse soils and intensive agricultural production systems increase the risk of agricultural non-point source pollution of water resources in the San Luis Valley.

A variety of irrigation techniques, including sprinkler and flood irrigation are used on the 1.5 million acres of crop, pasture, and hay land in the valley. The acreage often is treated with pesticides and fertilizers to control insects, diseases, weeds, and increase profitable crop production. Groundwater nitrate/ nitrogen concentrations exceed federal drinking water standards in some parts of the Valley.

The San Luis Valley Water Quality Demonstration Project was authorized by the U.S. Department of Agriculture in 1991 to address agricultural non-point source pollution issues in the Valley. The San Luis Valley Best Management Practices (BMP) Advisory Committee was formed to accomplish BMPO development objectives.

The BMP Committee consists of a cross-section of SLV producers, agricultural consultants, agrochemical field men, and local agency experts. The committee encourages voluntary adoption of improved management practices that will not only benefit the producer, but also conserves the quality of the Valley's groundwater resources.

Project Goals:

- Develop and demonstrate BMPs for irrigation, nutrient and integrated pest / plan management. Additional practices include nutrient conserving cover crops, surge and low pressure irrigation systems, annual wind strip barriers, minimum tillage, and fertilizer/ chemical mixing and loading facilities.
- Conduct BMP educational activities for growers, applicators and consultants in the Valley to promote the adoption of BMPs.
- Document water quality and economic effects of BMP implementation on field and watershed scales.

Colorado Division of Water Resources

Provides the following services

1. Administer and distribute Colorado's water according to Colorado's Doctrine of Prior Appropriation, and to assure protection of Colorado's rights while delivering water to state lines for the satisfaction of interstate compact agreements.
2. Protect the public, as well as the water users, from unsafe water storage facilities.
3. Administer the laws pertaining to water in accordance with court decree and state legislation.
4. Collect, record, maintain and distribute water usage records for all decreed and permitted water users.
5. Monitor wells and surface diversions to insure their usage is in accordance with court decree and state statute.
6. Assist the public in applying for, and receiving, in the most efficient manner, the 5,000 to 6,000 new well permits requested annually.
7. Provide the technical assistance, legal testimony and documentation necessary to assist and protect the citizens and other entities of Colorado in dealing with water issues from irrigation and domestic to wildlife habitat and recreation.

Ground Water

Administration and enforcement is a major duty of the State Engineer. Ground water information desk 303 866-3587.

Well permits

By law, every new well in the state that diverts ground water must have a well permit. To obtain a permit, file an application for approval of a permit with the state engineer. Over 10,000 applications are submitted for review annually and the staff determines the amount of water available and analyzes the potential for injury to other existing water rights under strict statutory guidelines.

Rules and Regulations

For Colorado ground water and all types of wells (including permit applications and forms) http://www.water.state.co.us/

Water Facts
7.48 gallons = 1 cubic foot
325,851 gallons = 1 acre foot = 43,560 cubic feet
1 cubic foot/second (cfs) = 1.9835 acre feet/day
1 cubic foot/second = 448.4 gallons/minute (gpm)
1 cubic foot/second = 646,000 gallons/day

Colorado maintains nine River Compacts with other down-river states. Colorado has 3,300,00 residents and 150,000 permitted wells.

Ground Water Monitoring in the San Luis Valley

The Water Quality Control Division of the Colorado Department of Public Health and Environment (CDPHE) has responsibility, under the Agricultural Chemicals and Ground Water Protection Program (SB 90-126), to conduct monitoring for the presence of commercial fertilizers and pesticides in ground water. The Agricultural Chemicals Program has been established to provide current, scientifically valid, ground water quality data to the Commissioner of Agriculture. rior to passage of SB 90-126, a lack of data had prevented an accurate assessment of impacts to groundwater quality from agricultural operations. his program will assist the Commissioner of Agriculture in determining to what extent agricultural operations are impacting ground water quality. The program also assists the Commissioner in identifying those aquifers that are vulnerable to contamination. The philosophy adopted is to protect ground water and the environment from impairment or degradation due to the improper use of agricultural chemicals, while allowing for their proper and correct use.

The ground water quality sampling program is intended to fulfill the following objectives:

- Determine if agricultural chemicals are present in the ground water.
- Provide data to assist the Commissioner of Agriculture in the identification of potential agricultural management areas.

The factors considered in selecting an area for monitoring are:

- Agricultural chemicals are used in the area.
- The ground water in the area is shallow in depth or vulnerable to contamination.
- The majority of the agricultural production in the area is irrigated.
- The soil types are prone to leaching.
- The alluvial and /or shallow bedrock aquifers are utilized for domestic water supplies.

The 1993 monitoring program focused on groundwater quality monitoring in one of Colorado's major agricultural regions, the San Luis Valley. The monitoring program included sample collection, laboratory analysis, and data analysis and storage. pon completion of the full analysis, which will include integration with previous and current studies by other agencies, this sampling program will provide the basis for determining a groundwater quality baseline for this region.

Mitch Yergert
Colorado Department of Agriculture
303 239-4151

Brad Austin, Colorado Department of Public Health and Environment
303 692-3572

Reagan Waskom, Colorado State University
970 491-6103

Water Division Three

Water Court: Alamosa
Basin: Rio Grande
Cities and towns: Alamosa, Monte Vista, Del Norte, San Luis, South Fork, Creede, Saguache and Center
Major rivers and creeks: Alamosa, Rio Grande and Conejos Rivers; Saguache, Trinchera and Culebra Creeks
Major aquifers: Unconfined Aquifer of the Closed Basin, Confined Aquifer of the San Luis Valley.
Water projects and reservoirs: Rio Grande, Platoro, La Jara, Smith, Mountain Home, Sanchez, Santa Maria, Terrace and Continental reservoirs; San Luis Lake
Percent of division's water used for agriculture: 97%
Recreation: Monte Vista and Alamosa National Wildlife Refuges, the Great San Dunes National Monument, several wilderness areas, Wolf Creek Ski Area, hunting, fishing, hiking & rafting

Recharge of aquifers - why recharge pits are important. Farmers learning to efficiently apply water through sprinklers has helped the recharge cycles after poor water years.

Well-A-Syst

A voluntary program to assist private drinking well users evaluate and modify practices to protect their drilling water supply. Information can be obtained on: private drinking water well, septic system, cistern, household hazardous waste, fertilizer, pesticide, livestock, and petroleum storage management.

A collection of materials on the Well-A-Syst program can be found at Cooperative Extension or the USDA office.

Colorado Forest Stewardship Guidelines to Protect Water Quality, Best Management Practices for Colorado

This book contains detailed information on Roads, Streamside Management, Wildfire, Timber Harvesting, Hazardous Substances and Stream Crossings for Colorado Forest Lands. It may be obtained and the Forest Service / BLM office in Saguache.

Additional Sources of Information

U.S. Bureau Of Reclamation
Alamosa Field Office
10900 Hwy 160 East, Alamosa, CO 81101-9518
719 589-5855

Colorado Division of Water Resources
http://www.water.state.co.us 970 565-3111

State Water Resources (Division of)
District 20 Water Commissioner
150 Washington, Monte Vista 719 852-4351
422 4th, Alamosa 719 589-6683

Colorado Water Officials Association
1276 County Road 205, Durango, CO 81301
SLV Water Quality Demonstration Project
Monte Vista, 719 852-0960

Rio Grande Water Conservation District
10900 Hwy 160 E, Alamosa
Dennis Felmlee 719 589-6301

US Forest Service & BLM
46525 Hwy 114, Saguache 719 655-2547

Intellinet, Title 33, Statute 303 832-8309

Water Research Initiative for the Interior West US.
http://www.cires.colorado.edu/sater/init.html

Public Information Program
http://www.waterinfo.org
http://www.water.state.co.us

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