



Economic Development Report

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PROFILE OF THE SOUTH PLATTE RIVER BASIN

Jenny Thorvaldson and James Pritchett¹

- Agriculture accounts for \$2.2 billion in sales for the South Platte Basin.
- 226,000 irrigated crop acres are expected to become dry by 2030 (SWSI).

Overview

Colorado's population is growing rapidly, with the statewide population growth from 2000 to 2030 projected to be about 65 percent. The proportion of the state's population living in urban areas has been increasing, corresponding to national trends. As Colorado's population grows and urbanizes, water is likely to shift from agriculture to municipal and industrial (M&I) uses. Indeed, cities plan to dry up about 300,000 acres of irrigated farmland statewide to meet future needs. In addition to the urbanization of agricultural lands, most water providers continue to acquire agricultural water rights, which are then allocated to other uses.

The purpose of this fact sheet (and the three accompanying fact sheets) is to describe the economic base of four river basins, which will set the foundation for discussing the economic effects of shifting water from agriculture to other uses. This fact sheet begins with a description of the basic demographics of the South

Platte River Basin, followed by descriptions of the basin's economic base and agricultural sector. Next, it discusses the relative water supply and demand amounts in the basin, ending with a discussion of the future direction of our study.

Colorado is home to eight major river systems,² whose surface waters are divided among many uses. The South Platte River Basin comprises about 20 percent of the state's land area. It is comprised of all or parts of 14 counties (Adams, Arapahoe, Boulder, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, Larimer, Morgan, Park, Teller, and Weld) located in the northeast corner of the state (Figure 1). The population of the South Platte Basin has increased by 34 percent since 1990, from 2,264,000 to 3,031,824 [1], and now accounts for 68.9 percent of the state's total population. The population of this basin is expected to increase by another 65 percent by 2030 (Figure 2).

Economic Profile

Seventy percent of the state's employment is in the South Platte Basin [Section 2, SWSI]. Annual value of sales and services in the South Platte Basin equal \$251 billion, the highest relative to the other 3 basins studied. Agriculture industries³ comprise \$2.2 billion (0.88 percent) of this value [MIG, Inc., 2002]. Focusing on the eastern half of the basin (Adams, Arapahoe, Elbert,

¹ Authors are a graduate student and an associate professor, respectively, in the Department of Agricultural and Resource Economics at Colorado State University.

² The Republican River Basin is considered to be a sub-basin of the South Platte River Basin.

³ These sales totals are from *production* agriculture (i.e., from raw, un-processed products, such as crop sales or cattle sales).

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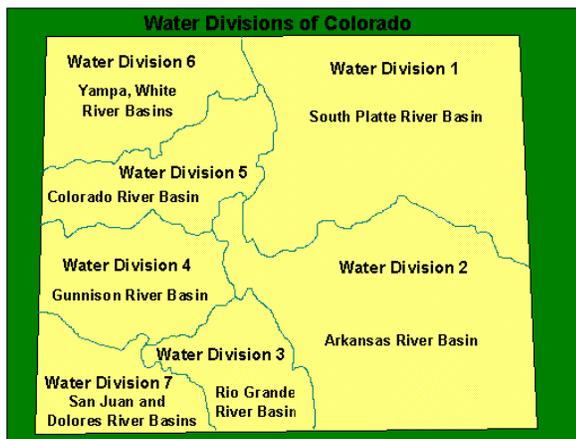


Figure 1: Colorado's Water Basins

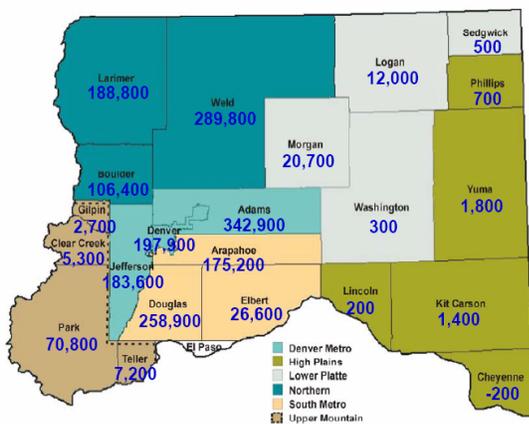


Figure 3 South Platte Subbasins and Changes in County Population 2000 to 2030
 Note that Broomfield county (not in Figure 3) will have an increase in population of 32,500 people

Figure 2: South Platte Basin Estimated Population Growth by 2030 (SWSI)

Morgan, and Weld counties), the percentage of the value of sales and services from agriculture industries rises to 2.04 percent (\$2.0 billion), which is the lowest percentage but the highest *total* value relative to the other 3 basins studied. Although there are many economic alternatives to agriculture in the South Platte River Basin, the reduction in irrigated cropland has implications not only for the agricultural sector, but also for many other sectors of the economy due to the high total value of sales coming from agriculture. If a substantial number of irrigated acres are removed from the eastern South Platte River Basin's economic activity, impacts will ripple through the local economy, due to lost sales of agricultural inputs and employee purchases of non-agricultural products with wages.

Areas relying more exclusively on irrigated agriculture for economic activity are likely to suffer greater impacts versus regions with a broader, more diverse economic base. Table 1 lists the major industrial sectors of the South Platte River Basin as a whole, while Table 2 lists the major industrial sectors of the eastern half of the basin.

Agriculture

The total land area of the 5 eastern South Platte River Basin counties is 9,124 square miles (5,839,616 acres), with over three quarters (80 percent) of this land area in farm and ranch. Nearly half (48 percent) of the area in farm and ranch is cropland. Of the cropland, 21 percent is irrigated and 79 percent is dryland (Figure 3). Table 3 lists the value of sales by crop. Forty percent of Colorado's agricultural production occurs in the South Platte Basin. The lands are irrigated by direct flow rights from canals, by storage from reservoirs, and by pumping from alluvial aquifers [5].

Table 1: Economic Demographics for the 14 South Platte River Basin Counties (2002)

Industry	Value of Sales (million \$)	Percent of Total
Total	\$251,465	100.00%
Notable Contributors (Sectors)		
Manufacturing	\$32,035	12.74%
Information	\$31,580	12.56%
Government and non-NAICs	\$23,913	9.51%
Real estate and rental	\$21,626	8.60%
Construction	\$20,502	8.15%
Finance and insurance	\$20,315	8.08%
Professional-science and technical services	\$17,848	7.10%
Wholesale trade	\$13,197	5.25%
Retail trade	\$11,938	4.75%
Health and social services	\$11,779	4.68%

Table 2: Economic Demographics for the 5 Eastern South Platte River Basin Counties (2002)

Industry	Value of Sales (million \$)	Percent of Total
Total	\$95,858	100.00%
Notable Contributors (Sectors)		
Information	\$16,620	17.34%
Manufacturing	\$11,907	12.42%
Finance and insurance	\$8,966	9.35%
Construction	\$8,869	9.25%
Real estate and rental	\$8,228	8.58%
Government and non-NAICs	\$6,860	7.16%
Wholesale trade	\$5,707	5.95%
Professional--Scientific and technical services	\$5,110	5.33%
Retail trade	\$4,588	4.79%
Health and social services	\$3,874	4.04%
All agriculture sectors combined	\$1,953	2.04%

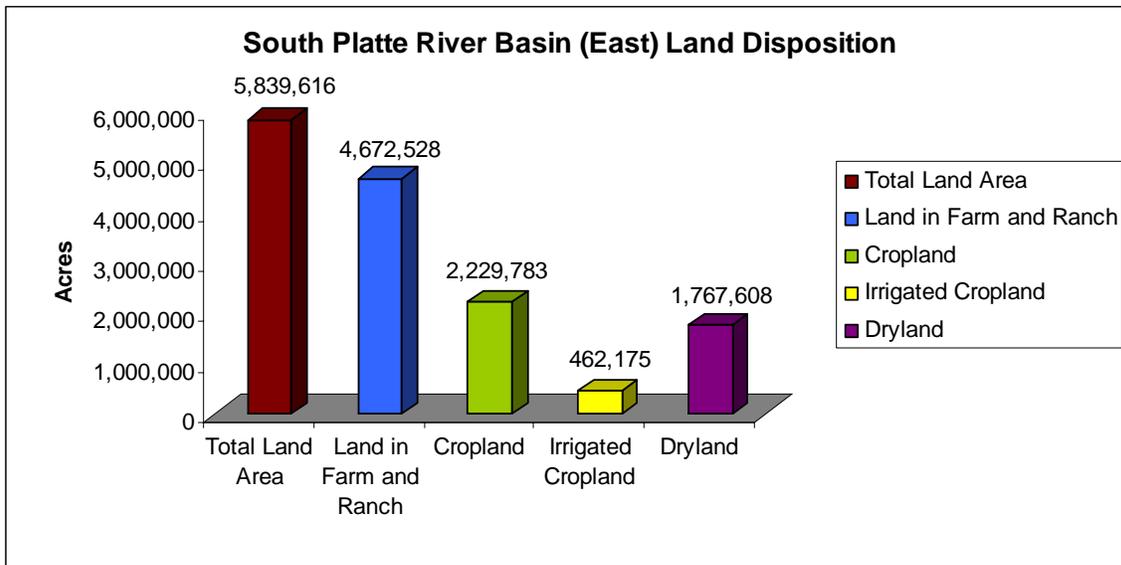


Figure 3: Eastern South Platte Basin Land Disposition

Table 3: Value of Sales by Irrigated Crop for the 5 Eastern South Platte River Basin Counties (2001)

Crops	Total Production of Irrigated Crops	Value of Irrigated Crop Sales (million \$)	Percent of Total Crop Sales
Total		210.55	100.00%
Notable Contributors			
Corn Grain (BU)	30,675,000	\$70.86	33.65%
Hay (TON)	610,465	\$54.94	26.09%
Corn Silage (TON)	1,521,600	\$31.19	14.82%
Potatoes (CWT)	2,250,000	\$20.93	9.94%
Sugarbeets (TON)	54,300,000	\$18.46	8.77%
All Wheat (BU)	2,085,500	\$6.42	3.05%
Barley Grain (BU)	1,820,850	\$5.61	2.66%

Evolving Water Uses

The South Platte Basin is laced with a complex system of man-made streams, ditches, canals, and reservoirs. Below the land surface is an underground aquifer. There is more surface water use in the South Platte Basin relative to the other 3 basins studied. Recreation is not a major water use in the South Platte Basin. The South Platte Basin is Colorado's most populous, diverse and industrialized basin, and the South Platte River is the most developed and over-appropriated of Colorado's major streams [5]. Demands for water in the South Platte River Basin are the most intense in Colorado and the result is increasing conflict over water use. The South Platte River Basin is projected to experience the largest increase in M&I and self-supplied industrial (SSI) water demand by 2030 (nearly two-thirds of the total increase in the state gross demand). A continuous urban region is emerging from Colorado Springs to Denver and on to Fort Collins. The growth in urban water demand can be linked directly to the projected population growth in the basin. Two million additional residents are projected to live in the South Platte Basin along the Front Range by 2030, and these additional residents need approximately 400,000 acre-feet (AF) of water to meet demand. This does not include the loss of 800 irrigation wells (another estimated 10,000-20,000 acres possibly impacted) due to new augmentation rules. New water storage projects are needed, but there are still existing water rights that need to be filled (i.e. agricultural).

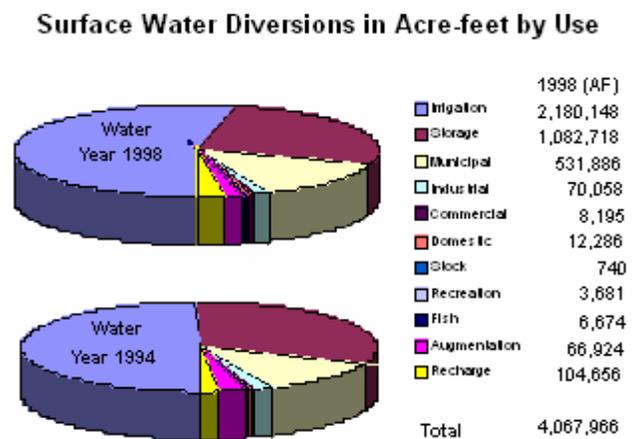
The South Platte River drains the greatest concentration of irrigated agricultural lands, and agriculture is the predominant water use, with approximately 2.2 million AF per year used for irrigation of 1.1 million acres (Figure 4). An additional 880,000 AF per year of groundwater is applied for irrigation and 100,000 AF per year of groundwater are used to meet municipal, domestic, livestock, industrial, and commercial purposes. The South Platte Basin contains both the major population of the state and its most productive irrigated agricultural lands, yet in terms of water availability the basin has only 12 percent of the state's supply [5]. Although agriculture is still a dominant water use, rapid changes are occurring and the impacts to rural communities are a key concern [Section 11, SWSI].

Agricultural shortages are prevalent and expected to continue throughout the entire basin. The need for augmentation sources for alluvial agricultural wells

along the South Platte has become a critical need. As M&I demands increase and providers turn to increased use of their reusable supplies and agricultural transfers, the availability of augmentation supplies for agricultural user decreases and agricultural users cannot compete with M&I providers on the price of augmentation water. Also, the increased use of reusable supplies and potential reduction in return flows from M&I water conservation efforts may result in reduced flows, decreasing available supplies for downstream agricultural users. Significant reductions in irrigated lands will occur in the South Platte unless augmentation supplies are developed for agricultural well augmentation and alternative sources of M&I water are identified.

The plans for nearly all South Platte water providers include some component of agricultural transfers and the optimization of existing supplies through new storage and/or reuse and exchanges. As urban growth continues, there will be some natural retirement of agricultural lands as these properties are converted to urban use. This will occur primarily in the Northern area, as very little agricultural use remains in the South metro and Denver metro areas. In addition to the urbanization of agricultural lands, most water providers continue to acquire agricultural water rights to some extent. There is reliance on Denver Basin non-tributary groundwater, which has a limited life, for municipal and industrial needs.

Cities are expected to dry up about 300,000 acres of irrigated farmland statewide to meet future needs, including up to 226,000 acres in the South Platte basin [Section 5, SWSI]. These agricultural transfers will



Source: Colorado Division of Water Resources, Division 1 Annual Reports and Division 7 Annual Reports

Figure 4: South Platte Basin Surface Water Uses

likely manifest themselves through outright purchases, developer donations, and development on irrigated lands. These supplies will be very expensive to develop as agricultural rights in the South Platte Basin have increased in price, and long pipelines and advanced water treatment facilities will be required. These agricultural transfers will also require that significant additional storage be constructed to provide carry-over supplies for the non-irrigation season and dry periods. Agricultural transfers may also result in reduced groundwater tables if historic return flows are not made in the location of historic irrigation. These transfers have the potential for impacts on both domestic and agricultural wells.

The number of AF of existing conditional storage rights⁴ in the South Platte far exceeds available supplies. In the South Platte Basin, many M&I providers have reservoir enlargement plans that will help them grow into existing rights and allow development of some existing conditional water rights [Section 10, SWSI]. Reuse is being pursued by most providers that have reusable supplies. While many major providers in the basin currently have identified future water conservation as an identified project and process to meet 2030 demands, they do not anticipate implementing more aggressive levels (Levels 4 and 5) of conservation. In fact, most providers indicated that they would be more likely to acquire additional agricultural rights than to implement aggressive levels of conservation [Section 6, SWSI].

Future Direction

The problems of managing the South Platte have been increasing ever since water users first began to bump against the limits of water availability. Early problems resulted in a system of laws and water rights administration which have served the state well. Now additional problems loom ahead, including increases in litigation and conflict, growing urban demands, water

quality issues,⁵ and finding ways to utilize and conserve the deep bedrock aquifers. The presence of threatened and endangered species also significantly affects water resources management and development.⁶

Agriculture represents approximately 91 percent of water used in Colorado and SWSI⁷ projections indicate that it will make up 86 percent of the water use in 2030. Seventy-five percent of the total value of Colorado crops is derived from the irrigated sector, highlighting the importance of, and dependence on, a secure water supply. The greatest changes in agricultural water use are expected to occur in the Front Range as M&I growth moves into agricultural lands and/or as water is transferred from agriculture to support growth. Understanding the impact of these changes on rural Colorado economies, and the effect on the open space provided by farms and ranches, is a key challenge for all Coloradans.

As the next step in our study we will use the number of lost irrigated acres predicted by SWSI to examine how such a loss in irrigated acres will alter economic activity in the region. We will use the IMPLAN input-output model to predict the direct, indirect and induced economic impacts stemming from this loss of irrigated agriculture in each of these four river basins. Our next fact sheet will discuss economic impact analysis and the use of input-output models. This will be followed a final fact sheet discussing the results and conclusions of our study.

Sources

“Table 1: Annual Estimates of the Population for Counties of Colorado: April 1, 2000 to July 1, 2003 (CO-EST2003-01-08).” *U.S. Census Bureau, Population Division*, April 9, 2004.

“South Platte/Republican River Basin Facts.” *Colorado Water Conservation Board*, March 2002.

4 A conditional water right allows an appropriator to secure a place in the priority line before any water is actually applied to beneficial use. To obtain a conditional water right, the applicant must show that the “first step” towards the appropriation has been taken. Once the appropriator actually places the water to beneficial use, an absolute decree may be issued with a priority date relating back to the date the appropriation was initiated through the “first step.”

5 Most prominent are problems of locating suitable hazardous waste disposal sites, clean-up of the groundwater contamination from the Lowry Landfill and the Rocky Mountain Arsenal, and salinity.

6 Endangered species within the South Platte Basin include the pallid sturgeon, whooping crane, least tern, and piping plover [6].

7 The Statewide Water Supply Initiative (SWSI) is an 18-month study by the Colorado Water Conservation Board (CWCB) to take a comprehensive look at how Colorado will meet its future water needs. SWSI has identified how much water Colorado will need to help meet the needs of its growing population. The state’s eight major water basins will need an additional 630,000 AF of new water by the year 2030 to meet projected demands, 53 percent more water than is being used today.

“Update on Statewide Water Supply Initiative-South Platte Basin.” *Statewide Water Supply Initiative*, October 2004.
Minnesota IMPLAN Group, Inc. 2002, Colorado State University, Fort Collins, CO.

South Platte Research Team, “Voluntary Basin-wide Water Management: South Platte Basin, Colorado.” *Colorado Water*, Colorado State University, May 1987.

Lower South Platte Forum: Valuing your Water, *Colorado Water*, Colorado State University, April 2005.