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Finding Water for One Million New Residents

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The population for the Northern Front Range of Colorado is projected to increase by almost a million people in the next 20 years to approximately 3.5 million. This area includes Denver, Larimer, Jefferson, Adams, Arapahoe, and Douglas counties. Depending upon their water-use practices, these new residents will need approximately 300,000 acre-feet of water for domestic and commercial purposes by the end of 2020. An acre-foot of water is the average amount of water used by a family of four in one year.

Some water suppliers will be able to satisfy their water needs for the next 20 years from existing supplies. For example, only 265,000 acre-feet of Denver's 345,000 acre-feet supply capacity is being used currently. Other water providers will need to obtain new water supplies before 2020. A water supplier generally has several sources from which to obtain additional water. This issue brief describes four possible water sources and the primary challenges of obtaining water from these sources. These sources include surplus river water, groundwater, transfers from agricultural water rights, and water reuse.

Surplus River Water

Of Colorado's seven river basins, only the Colorado River Basin has a significant amount of surplus water that could be developed for use in the Denver metropolitan area. Specifically, the Colorado River Basin has up to 450,000 acre-feet of surplus water that is not being used within the state or obligated to downstream states. This water is available to anyone who can satisfy the legal requirements to obtain it.

Challenges. Several obstacles could limit the use of additional river water including federal environmental laws and public opposition to major water development projects. For example, several endangered species depend on water from the Colorado River. The federal Endangered Species Act of 1973 may prohibit or greatly restrict a project that threatens the survival of these species. Large dams typically take 10 to 20 years to plan and build. Legal challenges based on federal environmental laws may add to a project's cost and delay construction. Other impacts may also limit the development of river water. For example, public opposition to large dams may be significant because dams typically inundate canyons and river fisheries which are popular recreational resources. Water projects that divert western river water to the East Slope, called transbasin diversions, also face opposition. Transbasin diversions remove water that could be used for recreation and to supply future West Slope development.

Nontributary Groundwater

Nontributary groundwater is groundwater that is essentially unconnected to surface streams. Colorado has significant nontributary groundwater resources including the Denver Basin Aquifer that underlies the Northern Front Range. This aquifer contains approximately 300 million acre-feet of usable water. This amount is 15 times greater than Lake Powell in Utah and 400 times greater than Blue Mesa Reservoir, Colorado's largest reservoir. This aquifer offers protection against extended droughts and a temporary water supply for rapidly growing municipalities until other supplies can be developed. In 1996, well owners pumped less than 2 percent of the amount allowed annually by statute from the aquifer.

Challenges. Water in the Denver Basin Aquifer is essentially nonrenewable, and well pumping can exceed the natural rate of recharge from rain and snow, which is often less than an inch per year. As the water level in an aquifer declines, well pumping becomes more costly. Some wells in the shallow edges of the Denver Basin Aquifer are already running out of water.

The geology of nontributary aquifers is complex, and the relation between groundwater pumping and surface streams is a contentious issue. Water rights on an overlying surface stream may be impacted by declining aquifer levels. Currently, the State Engineer is studying the geology and pumping practices of the Denver Basin to determine the impact of pumping on river water rights. Understanding the connection is important because the use of nontributary groundwater is projected to increase in the next decade.

Transfers of Agricultural Water Rights

A water right is a private property interest that may be sold or transferred freely, provided that no other water right is injured. Currently, most of Colorado's water is owned and used by agricultural interests. The value of this water is steadily increasing as demand for municipal water increases. Selling a water right to a municipality may be the most profitable use of an agricultural water right. Because no new dams or diversion facilities are involved, agricultural transfers also may be one of the least expensive means for a municipality to obtain water.

Challenges. Transferring a water right from a farm to a municipality may adversely affect a local farm economy. Already large tracts of agricultural lands have been taken out of production to provide water to Front Range municipalities. Farms that have sold their water right pay less property tax, employ fewer persons, and no longer purchase agricultural supplies from the local economy. Open space may also disappear as agricultural lands are developed for housing.

Reuse of Water

The Metropolitan Denver area currently generates approximately 80,000 acre-feet per year of water that may be reused. Water reuse occurs when water that returns to a stream from municipal sewage treatment plants, agricultural runoff, and other sources are captured and applied to another use such as irrigation. For example, a municipality may capture the discharge from its sewage treatment plant, further treat it, and then use the water on a city golf course. Current technology can treat sewage water to a level that satisfies federal drinking water standards. Only water that is introduced into a river basin from another basin or from nontributary groundwater may be reused.

Challenges. The public is reluctant to drink water that comes from a sewage treatment plant, regardless of the taste and quality. Water reuse also removes water from a stream that would otherwise have been used by downstream users such as farmers and municipalities. Reduced stream flows also affect water quality because there is less water to dilute pollutants from other sources. Reduced stream flows also impact water dwelling plants and animals and limit boating, fishing and other recreation.

Historically, local water supply decisions have been made by a community and its water provider. Due to geography, finances, and other factors, some communities have more supply options than others. For example, some communities do not overlie nontributary groundwater. A community's long-term success depends upon its ability to anticipate its water needs and carefully consider each available supply option.

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