Chapter 1: Common questions about water resources in the Middle Rio Grande Basin

This report summarizes the current (2002) understanding of water resources in the Middle Rio Grande Basin. The basin provides the water supply for the City of Albuquerque and other growing communities in the basin (with a combined population of about 690,000), as well as water for agricultural, industrial, and other uses. The goal of the Middle Rio Grande Basin Study is to provide the most complete scientific understanding of the hydrologic system in the region as a foundation for water-management policy. The goals of this report are to give the reader a better understanding of the major components of the hydrologic system and how the components interact, describe some of the scientific contributions of the Middle Rio Grande Basin Study, and describe how a ground-water-flow model is constructed and how it can be used to aid water-management decisions.

How much water do we have?

The answer to this question depends on our understanding of the natural hydrologic system as well as legal constraints on the management of water resources in the Middle Rio Grande Basin. Though scientists cannot definitively estimate how much available water remains in the aquifer system, Chapter 4, "The hydrologic system of the Middle Rio Grande Basin" (p. 41), describes the water resources in the basin and issues that affect the management of those resources.

How much water do we use?

Water use by municipalities can be quantified with some certainty; however, a large number of production wells in the Middle Rio Grande Basin are not metered, and irrigation use can only be estimated. The "Water use in the basin" section on page 60 describes what is known about water use in the basin.

City of Albuquerque production well Leyendecker no. 1.

How long will our supplies last?

Santa Fe Group sediments exposed near Bernalillo. Such deposits form some of the most productive zones of the aquifer.

A definitive estimate of how long water supplies of suitable quality and quantity will last in the Middle Rio Grande Basin is not possible. The answer depends on future population growth rates and water demand, new technologies for producing or recharging water, newly available sources of water, and the environmental, economic, and social changes we are willing to accept in using ground and surface water. Currently, water is being withdrawn from the aquifer faster than it is being recharged or replaced; thus, ground-water levels are declining. Such ground-water use will eventually deplete the aquifer because there is a finite volume of water in the aquifer. As a result, Albuquerque is currently (2002) planning to use surface water to help create a sustainable water supply. Chapter 4, "The hydrologic system of the Middle Rio Grande Basin" (p. 41), discusses what is known about water supplies in the basin, and the "Effects of ground-water withdrawals" section (p. 85) describes the possible effects of declining water levels in the aquifer.

How effective are water conservation efforts in the area?

The City of Albuquerque reduced its water use by 23 percent between 1995 and 2000, with a stated goal of a total reduction of 30 percent by 2005 (City of Albuquerque Public Works Department, 2000). The Middle Rio Grande Conservancy District is currently considering ways to increase irrigation efficiency (Shah, 2001). By reducing water use, less ground water is pumped from the aquifer, and more remains available for future use. The "Water use in the basin" section on page 60 describes what is known about water use in the basin.

How rapidly are ground-water levels declining?

Ground-water levels are declining in many parts of the Middle Rio Grande Basin; the water table has declined more than 160 feet since 1945 in some areas. The "Ground-water-level declines" section on page 47 describes what is known about predevelopment and current conditions.

Is municipal and(or) industrial pumping lowering ground-water levels outside major metropolitan areas?

Currently (2002), the largest ground-water-level declines in the Middle Rio Grande Basin are focused around municipal-supply wells. Eventually the effects of pumping will propagate outward from the wells and cause water-level declines in areas away from pumping centers. The "Ground-water-level declines" section beginning on page 47 shows ground-water-level maps of the basin during different years.

Have ground-water-level declines triggered land subsidence?

Some localized subsidence has occurred in the Albuquerque area, though this is probably related to the draining of swampy areas and not to ground-water pumping. The "Subsidence" section on page 86 and Box *J* on page 88 describe this subsidence, discuss the potential for widespread subsidence due to aquifer depletion, and show how scientists are studying the issue.

How will water chemistry affect the use of ground water?

Several factors potentially can affect water quality (and thus the suitability of water for a particular use) in the Middle Rio Grande Basin: natural conditions, human-induced contamination, and pumping effects. Chapter 6 on page 91 discusses what is known about ground-water chemistry in the basin.

How much water in the basin is appropriated?

Under the terms of the Rio Grande Compact, water in the Rio Grande is fully appropriated between Colorado, New Mexico, Texas, and Mexico. Within the Middle Rio Grande Basin, water rights have not yet been adjudicated, though the New Mexico Office of the State Engineer considers the surface flows of the Rio Grande to be fully appropriated. The "Water appropriation" section on page 69 discusses the appropriation of water in the basin.

Rio Grande Conveyance Channel at San Marcial and USGS streamflow-gaging station. Completed in 1958, the channel has helped New Mexico meet its Rio Grande Compact obligations.

How much water can be pumped from the aquifer system using the present infrastructure?

This also is a difficult question to answer because much of the necessary information is unavailable. Wells have a limited life because of corrosion and mechanical deterioration; thus, any well will eventually need to be replaced. In addition, declining ground-water levels will necessitate the deepening of existing wells or construction of new, deeper wells. Water-level declines are dependent on ground-water withdrawals, which in turn are affected by population increases, conservation measures, and the use of additional sources of municipal water supply. The possible effects of declining water levels in the aquifer are discussed in the "Effects of ground-water withdrawals" section on page 85.

A USGS technician measures flow in the Jemez River below Jemez Dam. Such measurements are critical to understanding ground-water/surface-water interaction.

How interrelated are the ground-water and surface-water systems?

As knowledge of the hydrology of the Middle Rio Grande Basin improves, so has the understanding of how the ground-water and surface-water systems interact. The current understanding of this interaction and the techniques used in the Middle Rio Grande Basin Study are discussed in Chapter 5 on page 71, Box *H* on page 78, and the "What the ground-water-flow model tells us about the hydrologic system of the basin" section on page 110.