

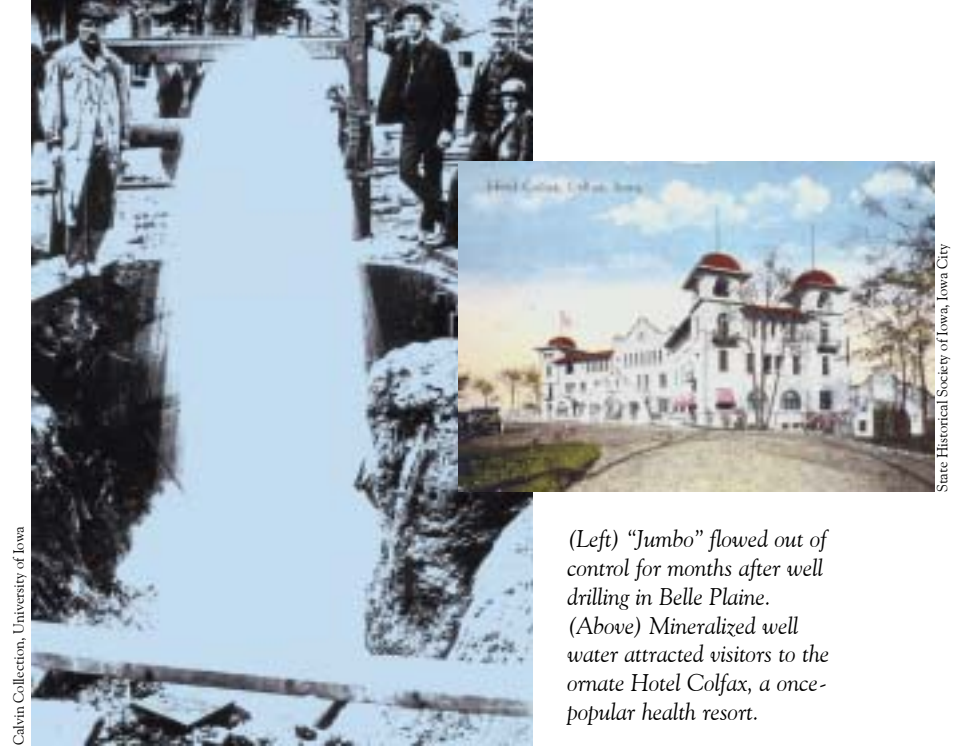
# INTRODUCTION to GROUNDWATER

*“Delicious water, clear, cool, refreshing, wells out from the hillsides in generous volume at all the water-bearing horizons, and each spring-fed rivulet rushes off, sometimes with clamorous haste, to add its tribute to the axial stream.”*

– Samuel Calvin  
*Geology of Allamakee County, 1895*

Water sources have always been a precious commodity for human life. So it’s not surprising that one of the oldest words in the English language refers to water, especially where it flows from the ground. The word “well” originally meant a spring, a fountain, or surging water. Only later did it evolve to mean a pit or hole sunk into the earth to reach a supply of water – groundwater. The word “source” means to spring forth or to rise, and the word “resource” refers to a new or reserve source of supply. These linguistic roots of the phrase “groundwater resources” emphasize the long-standing need to find water supplies within the earth.

On occasion, Iowans encounter groundwater in places that rouse their curiosity about its origin and extent. For example, hillside seeps and perennial wet spots, notorious hazards for farm equipment, are often reported on hillslopes across southern Iowa.



Calvin Collection, University of Iowa

State Historical Society of Iowa, Iowa City

(Left) “Jumbo” flowed out of control for months after well drilling in Belle Plaine.  
(Above) Mineralized well water attracted visitors to the ornate Hotel Colfax, a once-popular health resort.

Elsewhere, *springs\** flow vigorously from recessed crevices in the limestone bedrock of northeastern Iowa. Small waterlogged mounds of black peat, known as *fens*, are host to unusual plants and insects at scattered sites across northern Iowa. Newspaper accounts from 1886 reported an unexpected gush of water known as “Jumbo” during *well* drilling in Benton County (photo above). The Jasper County town of Colfax was a popular health resort in the 1880s, as the mineral waters from its wells were presumed to have therapeutic effects (photo above). And, no matter how dry the summer, most of Iowa’s rivers continue to flow. The natural phenomenon behind all of these conditions is groundwater. Each example offers a glimpse of the vast, largely unseen world of water that occupies the seemingly solid earth beneath our feet. The purpose of this publication is to explore that realm as it is understood here in Iowa.

\* Italicized words are defined in the Glossary.



Clay Smith

Groundwater feeds Iowa's surface lakes and streams, entering through the sides and bottom of stream beds. (Wilson Island State Park, Harrison County)

Consider that thousands of years ago, water in its solid form inched southward as massive glaciers that brought the raw materials for much of Iowa's present landscape. In turn, the melting of those glaciers laid the courses of most rivers draining the land today. Even the state's deeper bedrock strata, often seen as picturesque ledge and bluff outcroppings, began as sediment settling out of seawater on ancient sea floors, along coastlines, or in stream channels millions of years ago.

These past geological processes thus produced the earth materials that contain Iowa's present surface water and groundwater resources. The geologic deposits determine where groundwater occurs, how fast it moves, whether it can be tapped by wells, and where it will return to the land surface. These deposits also affect the natural quality of today's groundwater supplies, as well as their vulnerability to contamination from human activity.

As noted, some water resources, such as rivers, lakes, and springs, are easily seen on the land surface (photos above, far right). Their underground counterpart – groundwater – is less visible in our

surroundings; yet 80 percent of all Iowans depend on groundwater for their household water supplies. Though this resource is essential to life and well-being, most people are unfamiliar with how groundwater occurs, or how local and regional geological conditions affect the abundance and quality of groundwater in wells. Nor are most people aware of the basic hydrologic connections between groundwater, surface water, *watersheds*, and biological habitats.

Below ground, as well as above, water is an ever-present geologic force as well as a vital natural resource. And because water in our environment is forever interconnected as part of the broader hydrologic cycle, human activities that affect water quality in one part of the system can carry through to affect other parts of the system. Historically, our groundwater was considered a safe, pure source of drinking water; whereas today, movement of contaminants into the groundwater realm is a focus of many of Iowa's environmental protection and natural resource issues.



Michael Bounk



Lynn Berts

Water tables are especially shallow in north-central Iowa. Following heavy rainfall or removal of drainage tiles, wetlands return quickly to low sags on the landscape. (Palo Alto County)



Art Berts

Springs occur where groundwater flow emerges at the land surface. Dunning Spring, near Decorah in Winneshiek County, tumbles from a crevice in the limestone bluff on the north side of the Upper Iowa River valley.

(Photo left) Groundwater can infiltrate crevices in limestone and dolomite, eventually enlarging them to form subterranean cavern systems such as Cold Water Cave in Winneshiek County.



Roger Hill

The water in this Hamilton County wetland accumulates from groundwater seepage as well as from rainfall and snowmelt. A legacy of melting glacial ice, such wetlands function today as valuable habitat for native plant and animal species and natural filters for water resources. (Bjorkboda Marsh)