

**NO LIFE
WITHOUT IT
SOUTH DAKOTA
WATER**



NO LIFE WITHOUT WATER

The kitchen faucet gushing, a shimmering lake broken by a skipped rock, a torrent roaring over a dam spillway - South Dakota water takes many forms. Great dams on the Missouri River churn out electricity. Anglers pull record walleye from glacial lakes. Underground pipelines carry clean water hundreds of miles.



Photos by South Dakota Tourism



In this exhibit, see how South Dakotans use, argue about, and manage the state's water resources.

GROUND WATER

The most common source of water in South Dakota is ground water from aquifers. These layers of underground rock hold enough water to make drilling a well into them possible. Rain recharges the porous rock in the aquifers found throughout the state.



A windmill's gearbox moves a rod with each turn of the wheel to pump water from the well to the surface. Windmill in Jackson County.

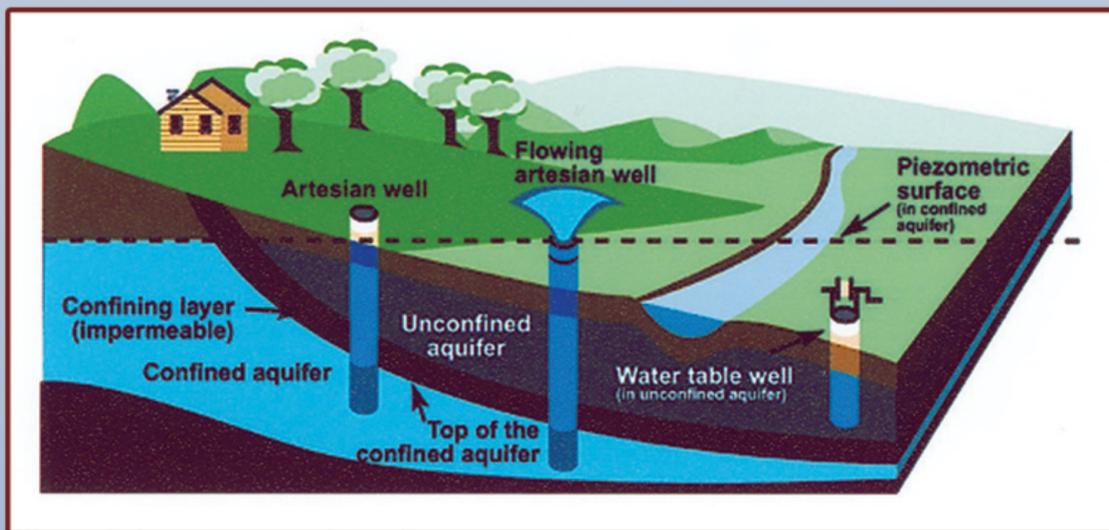
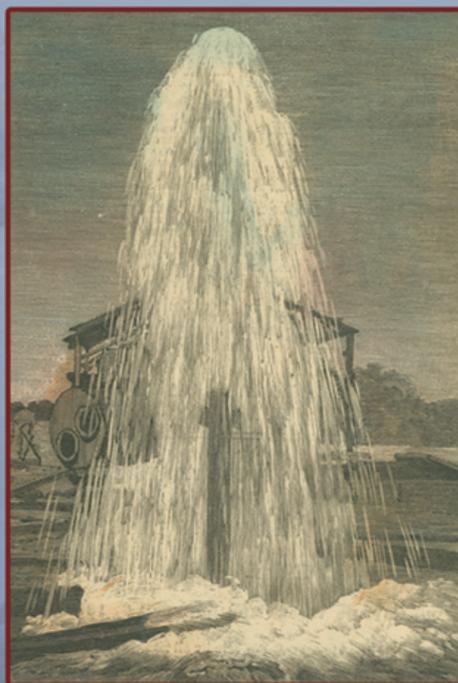


Photo by Environment Canada

When nonporous rock surrounds an underground aquifer pressure builds. When the pressurized aquifer is tapped by a well, the pressure pushes the water to the surface without a pump. These artesian wells can be dramatic, shooting water high into the air. Illustration of an artesian well at Yankton, *Scientific American*, 1889.



GEOLOGY MATTERS

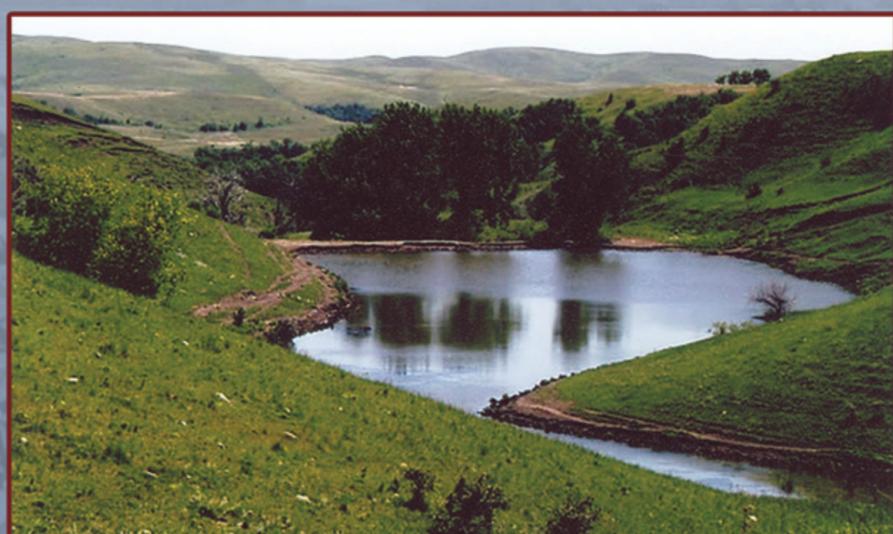
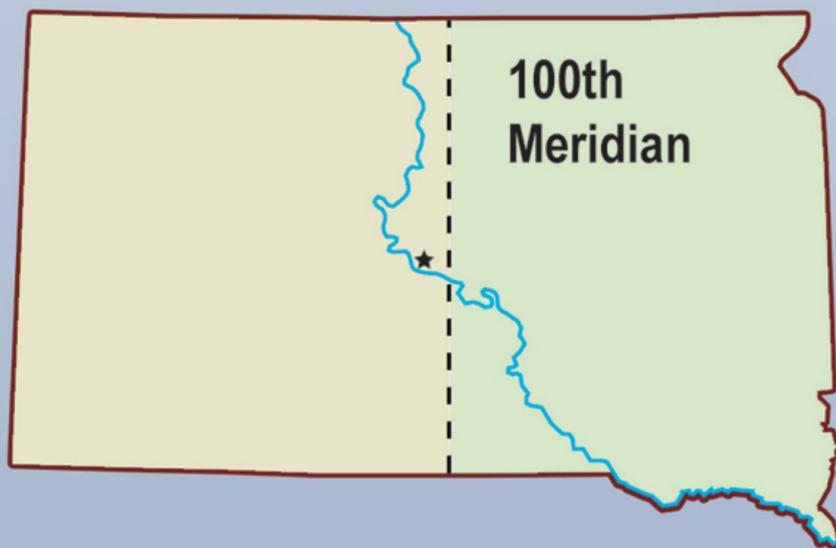
Travelers across South Dakota encounter a wide variety of landscapes. In eastern South Dakota, the land was shaped by glaciers. As the glaciers receded, they left behind rolling, hilly terrain pocketed with glacial lakes. These prairie potholes are part of one of the world's greatest flyways for migrating waterfowl.



Aerial photo of the Glacial Lakes region, known for its Prairie Pothole lakes.

Photo by U.S. Fish & Wildlife Service

The 100th Meridian serves as a dividing line between wet and dry areas in the state. East of the meridian 20 inches of rainfall or more is common while to the west less precipitation falls.



Stock dams are dug in drier areas to catch rainwater and runoff for watering livestock. Dam Hyde County, SD.

Photo by Howard J. Woodard

FLOOD!

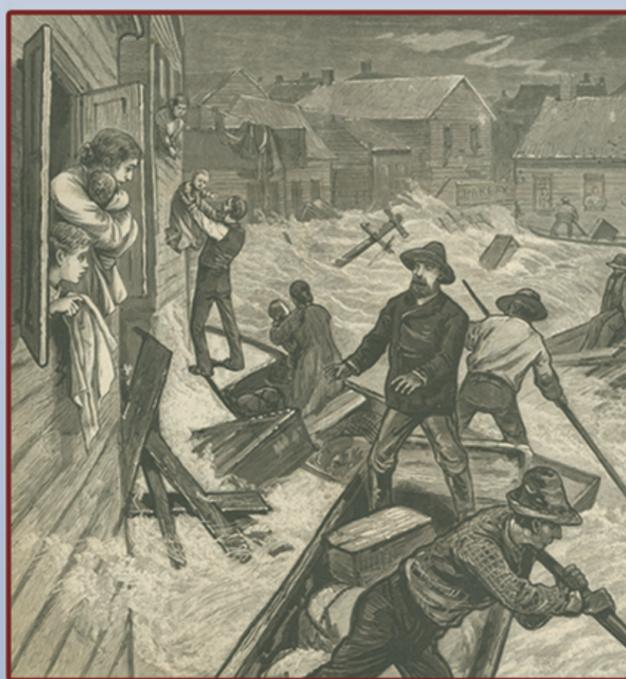
Four different types of flooding impact South Dakota – flash flooding, long-rain flooding, flooding due to snow melt, and flooding if a dam breaks.



A devastating flash flood occurred when Rapid Creek left its banks on June 9, 1972, in Rapid City. Fifteen inches of rain had fallen on the Black Hills in less than 6 hours. 238 lives were lost.

Melting snow and ice once caused large floods along the entire length of the Missouri River. In the Great Flood of 1881, ice jams created extreme flooding. Yankton, Vermillion, and Pierre were all severely damaged.

*Rescuing residents of inundated dwellings at Vermillion.
Frank Leslie's Illustrated Newspaper, April 16, 1881*



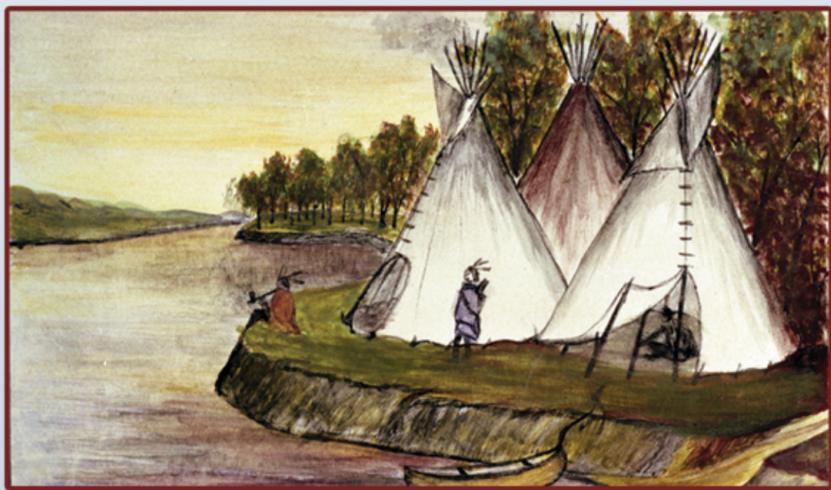
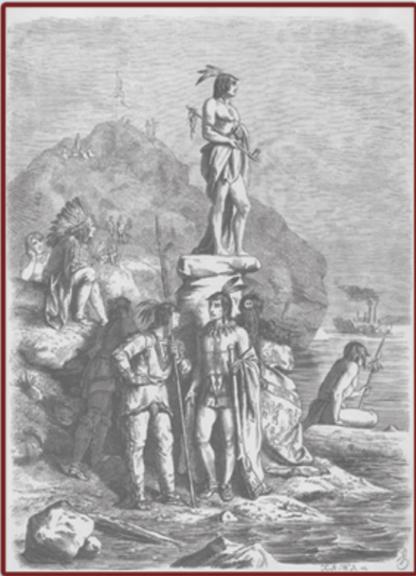
Spring rains and snow melt can cause major damage as rising rivers and lakes spread into fields and communities.

Day County, 1997 and Aberdeen, 2007.

Photo at right by Brown County Emergency Management/Aberdeen Fire Department

ALONG THE MISSOURI

American Indians relied on the Missouri River for transportation. Both the Arikara and the Sioux tribes lived along its shores and depended on it for protection and trade.



The Sioux along the Missouri River.

Explorers followed the Missouri through South Dakota. The Verendrye brothers explored parts of the river as they searched for a water route to China in 1743. Lewis and Clark traveled the Missouri 1804-06 with their Corps of Discovery.



The French-Canadian Verendrye brothers passed through South Dakota.

Painting by Frederick Remington, Colliers' Magazine, March 17, 1906.

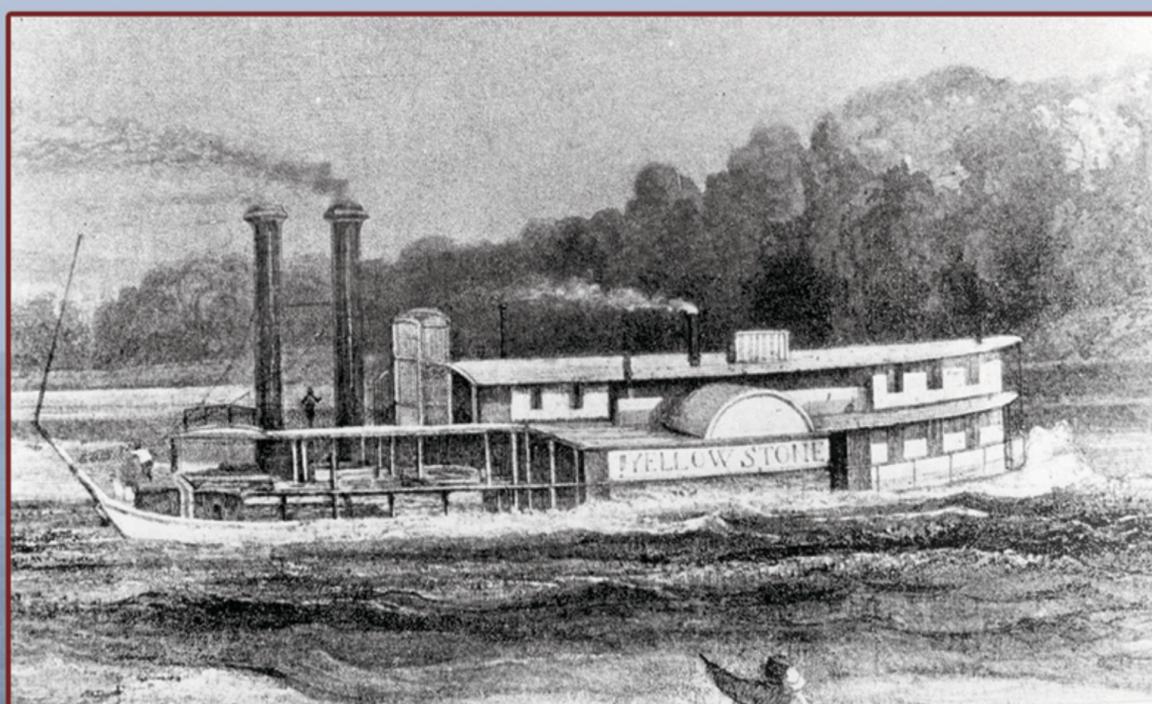
TRADE ON THE MISSOURI

Fur traders depended on the Missouri to connect them to eastern markets. The American Fur Company established one of the river's largest trading posts at Fort Pierre in 1832.



Trade flourished at Fort Pierre, painted by Karl Bodmer in 1833. Buffalo robes and furs were exchanged for guns, coffee, tobacco and other goods.

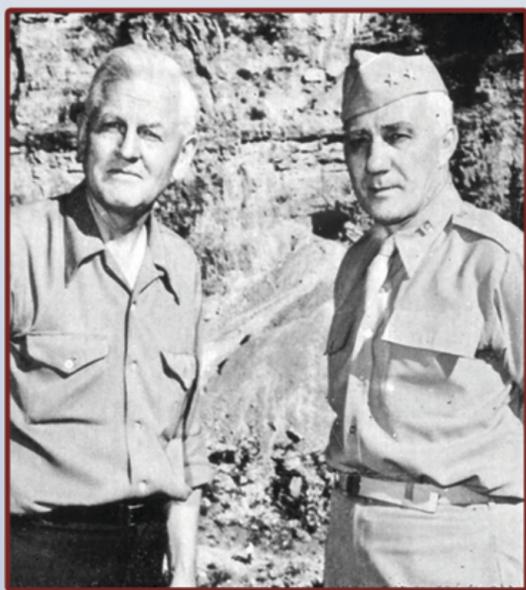
Rare Books Division, Special Collections, J. Willard Marriott Library, University of Utah



Fast currents, sandbars, and snags did not keep steamboats off the Missouri. The *Yellowstone*, the first to navigate the upper Missouri, took 80 days for the 1,760-mile journey from St. Louis to Fort Union in Montana.

DAMMING THE MISSOURI

With floods causing major property damage and power needs growing, plans were made to dam the Missouri. Two initial plans – one from the Corps of Engineers and one from the Bureau of Reclamation – were eventually combined into the Pick-Sloan Plan.



Plan developers William Sloan, Bureau of Reclamation (left) and Colonel Lewis A. Pick, Army Corps of Engineers.

Photo by U. S. Army Corps of Engineers



Big Bend Dam

Photo by South Dakota Tourism

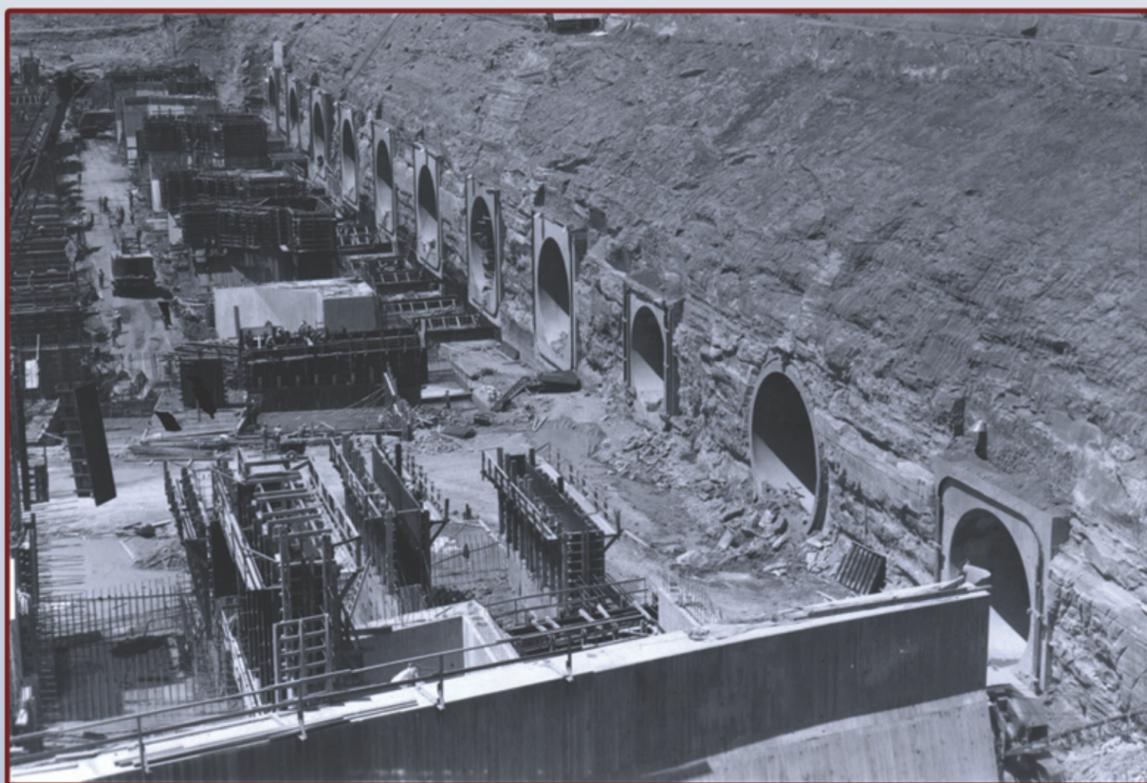


Pierre's last major flood occurred in 1952.

Fort Peck Dam in Montana had been built in the 1930s by the Works Progress Administration. The Flood Control Act of 1944 put the Pick-Sloan Plan in motion and added five more main-stem dams to the Missouri.

MISSOURI DAMS

Four of the six Missouri River dams are in South Dakota. The Pick-Sloan Plan put rolled-earth dams at Oahe, Big Bend, Fort Randall and Gavins Point. The large reservoirs behind each dam became the “Great Lakes” of the Missouri.

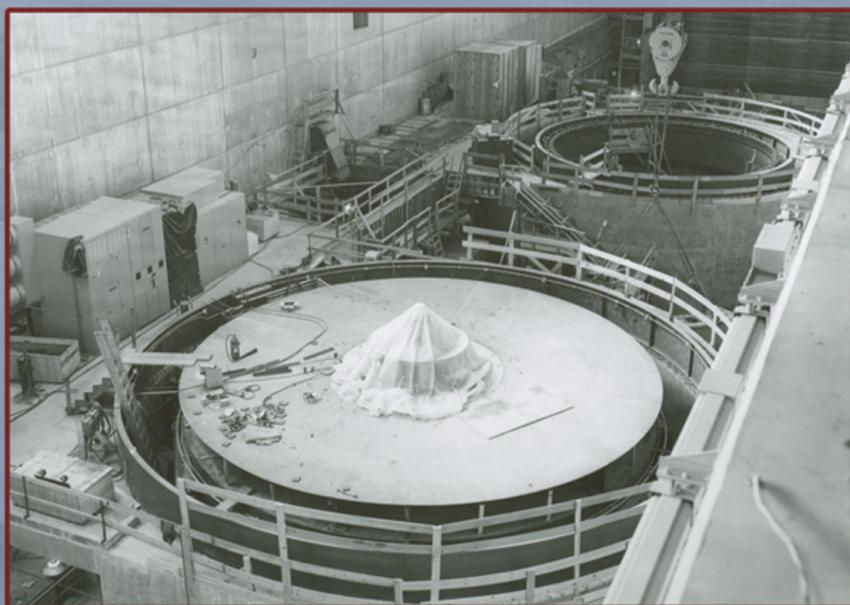


Fort Randall Dam under construction, 1946-1954.



Building Oahe Dam, 1948-1962.

Huge turbines inside Big Bend's powerhouse, completed in 1966.

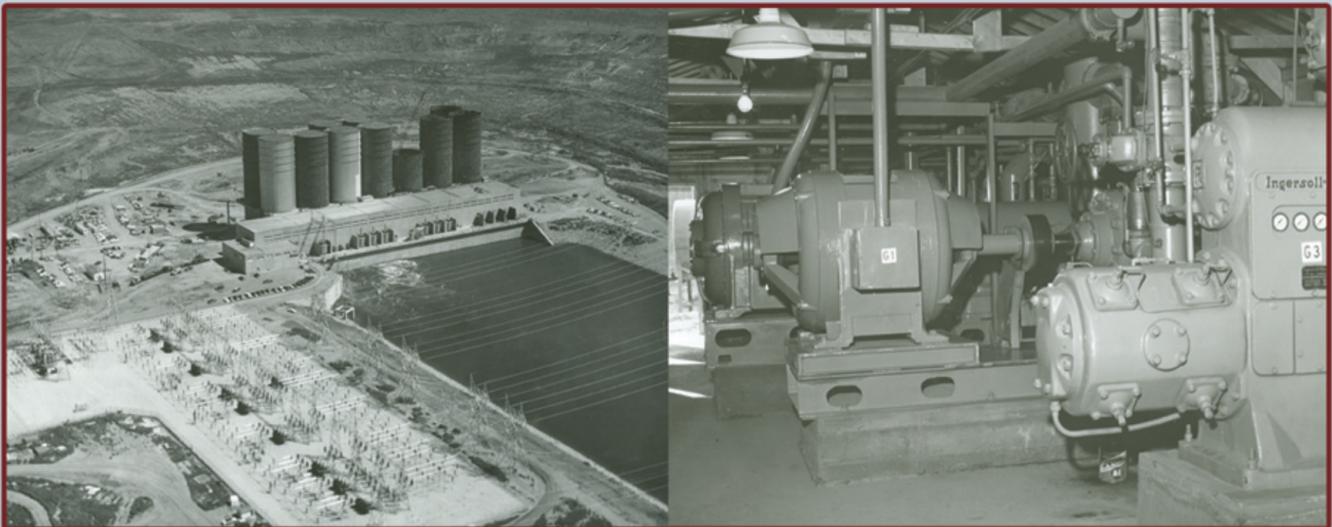


IMPACT OF THE DAMS

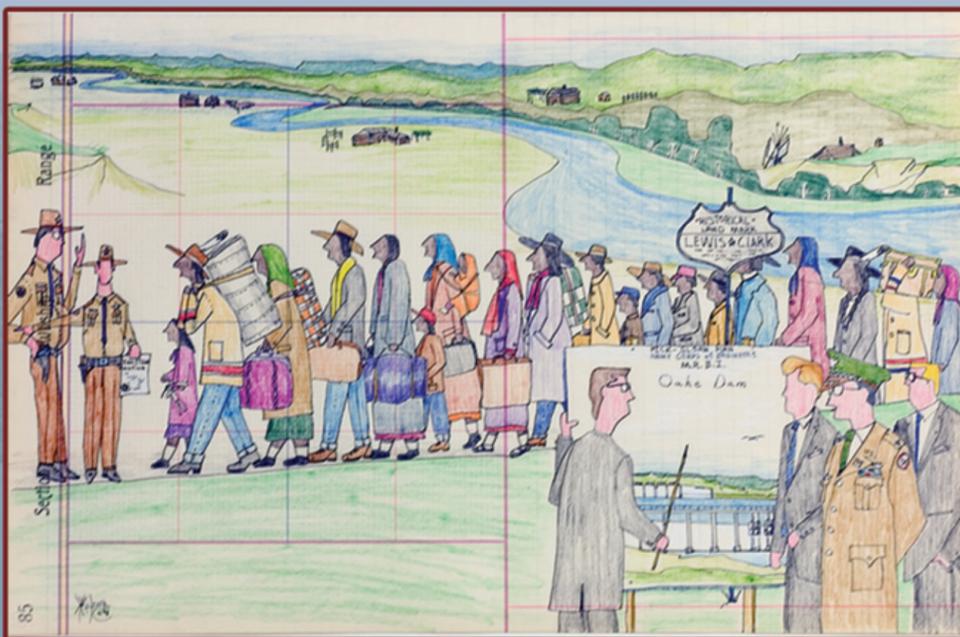
The dams brought flood control, improved recreation, and cheap electricity – but at a high cost. The state lost 611,642 acres of land. Over half was tribal land and its residents were forced to move. Large segments of natural river habitat disappeared under the waters of the reservoirs.



Recreation became big business as anglers, boaters and swimmers enjoyed the new reservoirs. Gavins Point recreation area, ca.1960.



Banks of power lines at Oahe Dam carry electricity from the generators to outlying areas, ca.1965.



Dam construction forced the relocation of hundreds of Indian families. Ledger drawing by Dwayne Wilcox, 2005.

WATER BATTLES

Irrigating the James River Valley with water from the Oahe Reservoir was a key factor in Pick-Sloan.

As the reality of digging canals and irrigation ditches across productive farmland sank in, vocal opposition to the plan arose. The United Family Farmers (UFF) organized to stop the Oahe Irrigation Project.



The South Dakota Reclamation and Water Development Association seeks:

To aid and promote the conservation and utilization of the land, water, and power resources of South Dakota;

To support the claim to a portion of water stored in the Missouri River reservoirs in South Dakota for future use within our state;

To assist Conservancy Sub-districts in their efforts toward securing full water resource development;

To cooperate with Governmental agencies in their programs of irrigation, water and soil conservation, flood control and power development; and

To promote the adoption of Federal and State legislation favorable to these purposes.

Higher Returns Forthcoming

BUREAU OF RECLAMATION records show that average gross returns per acre on the irrigated farms of its projects are more than two and one-half times those received by farmers the country over. This average is \$36.33 per acre compared with the national average of \$14.41 for all field and fruit crops during the period 1931 to 1939.

The large returns from irrigated land are due not only to increased yields, but also to more valuable crops such as sugar beets, alfalfa, seeds, vegetables, fruits, and specialty crops of a wide variety which can be produced under controlled moisture.

The irrigated farms will not only make much feed available for both the dry-land and range farmers in South Dakota, but will also serve as feeding areas in the State where cattle, sheep and hogs can be fattened. Thus, the development will be very important to the dry-land and the range farmer, as well as to those who are actually irrigating their farms.

Harvesting Alfalfa on Belle Fourche Project

Photo by USBR



"Black Blizzard"—a typical dust storm

Irrigation Stabilizes Agriculture

DROUGHTS have been coming to the Great Plains for centuries, and each day brings us one day closer to another drought period. There can be a serious drought even during a wet season.

REMEMBER the drought period in the '20's when grain fields dried up, top soil blew away, and livestock was slaughtered to keep them from thirst and starvation. Incomes were reduced, farm mortgages were foreclosed, farms were abandoned, and farmers moved out by the thousands.

Controlled and assured moisture by irrigation removes the risk of inadequate water to carry crops through to maturity.

Drought Scene During 1926. Remember!



After a long and intense political battle, the UFF won out. In 1977, the federal government suspended funds for the project. To compensate for the lost irrigation funds, Congress authorized the Walworth-Edmunds-Brown (WEB) water project to pipe Missouri River water to northeastern South Dakota.

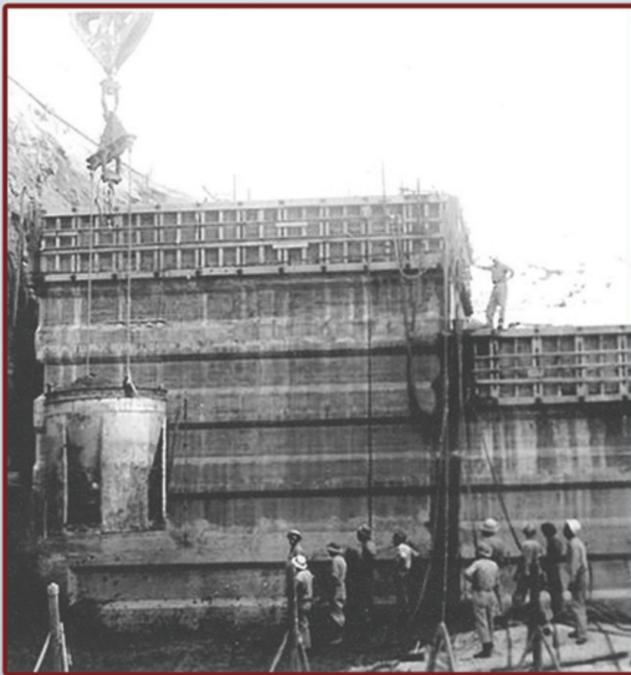


An oversized billboard near Huron, where the Oahe Irrigation Project Office was located, showed the strong feelings about the project, 1974.

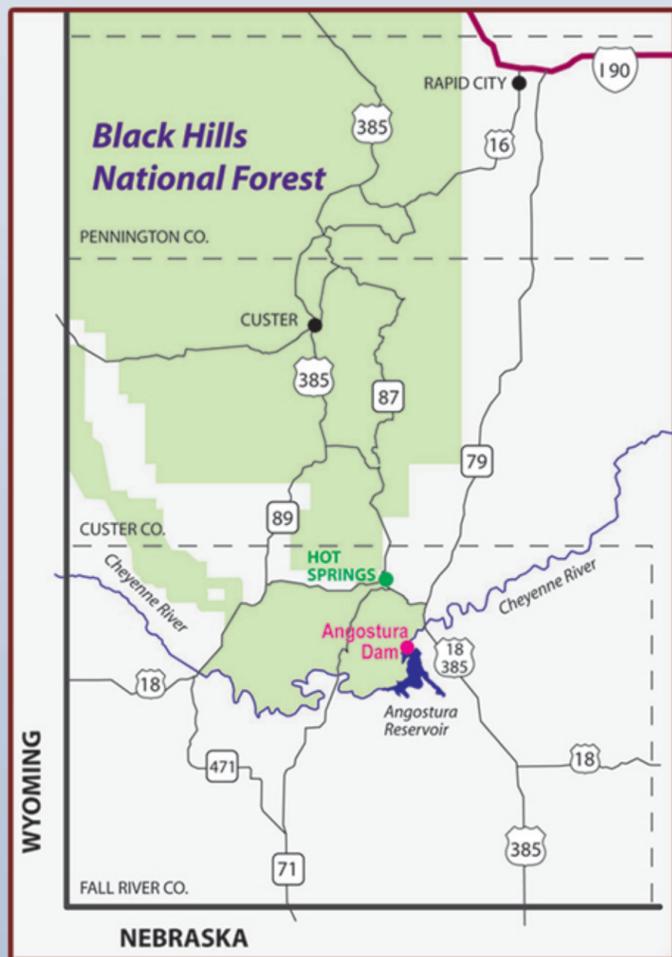
Harriet Montgomery Water Resources Collection, Beulah Williams Library Archives & Special Collections, Northern State University

ANGOSTURA DAM

Completed in 1949, the Angostura Dam was the first Pick-Sloan project to be completed. Angostura is Spanish for narrow opening – an appropriate name as the earth-and-concrete dam was built between narrow steep-walled canyons in the Cheyenne River valley.



Pouring Angostura Dam's concrete foundation, ca 1947.
Photo by U.S. Bureau of Reclamation



One of Angostura's original purposes included hydropower production, but the Cheyenne River's low water flows made such production impractical.



Angostura Dam, ca. 1950.

ANGOSTURA USES

Angostura Dam is used for irrigation, flood control and recreation. A canal system moves water to farmland in Fall River and Custer counties. Irrigation provides the area with a dependable water supply.



The first irrigation water from Angostura was delivered in 1953. The system includes about 60 miles of main and lateral canals.



Fishing, boating and other water activities are enjoyed by many at Angostura Reservoir. The Reservoir is the largest warm-water recreation lake in a 100-mile radius.

292 MILLION GALLONS

Dryland farming depends solely on direct rainfall. In South Dakota, irrigation – applying water to farmland via artificial means – accounts for over half of all water use in the state at 292 million gallons per day.



Sprinkler irrigation systems use overhead pipe on wheel-mounted towers that move across the field. Irrigation system near Aurora, Brookings County, SD.

Photo by Howard J. Woodard

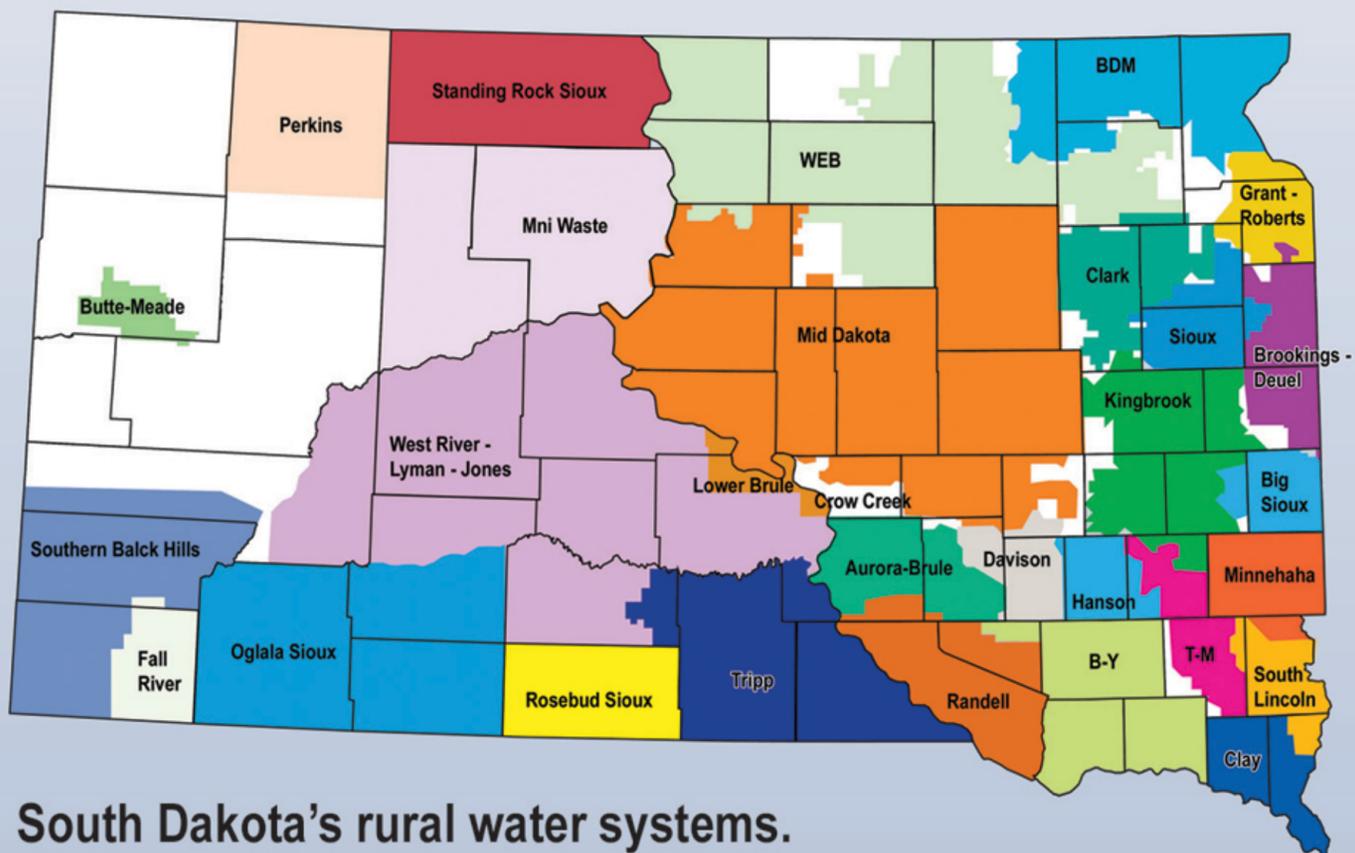
Aerial view of irrigation pivots on Lower Brule and Crow Creek Reservations.



Canals carry irrigation water in northwestern South Dakota. Completed in 1914, Orman Dam near Belle Fourche and its irrigation canals (shown above) were one of the earliest dam projects in the state.

DRINKING WATER

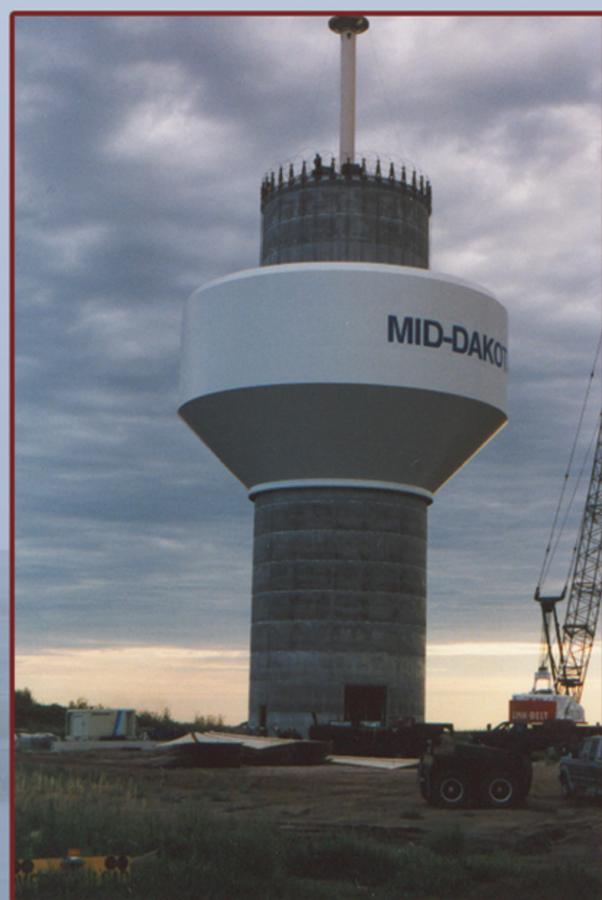
Two out of every three South Dakotans are served by a rural water system. Over 40,000 miles of underground pipeline carries safe and reliable water to residents across the state. The state has enough pipeline to circle the earth 1.5 times.



South Dakota's rural water systems.



Mni Wconi water tower near Kadoka.

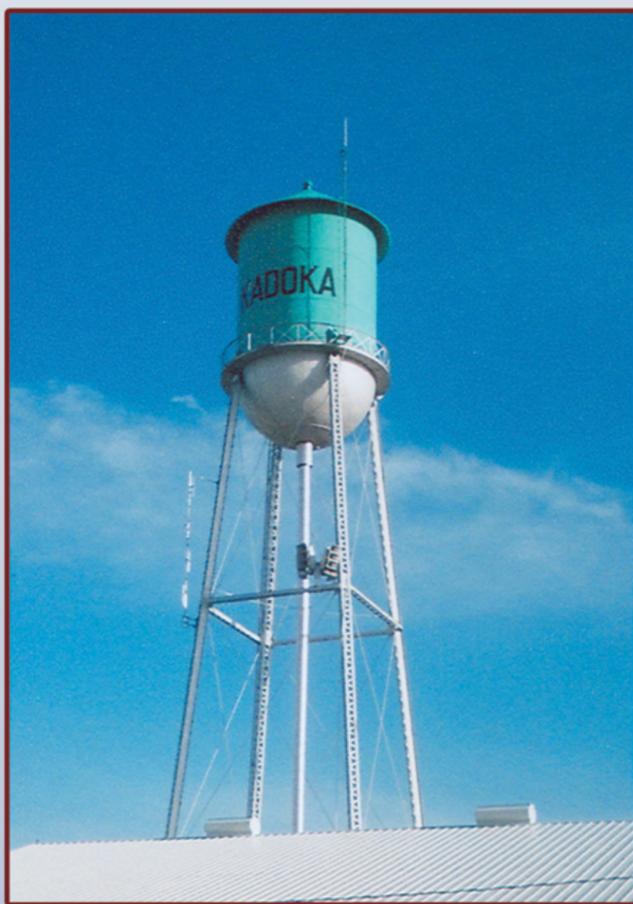


Mid-Dakota water tower under construction near Highmore.

Photo by U.S. Bureau of Reclamation

WATER TOWERS

One of the tallest structures in many small towns, the water tower serves a practical purpose. Water is pumped up into the tower where gravity pushes it out into the town's water system. They also make handy spots to paint the town name and school mascot.



Water tower at Kadoka.



Water tower at Murdo.



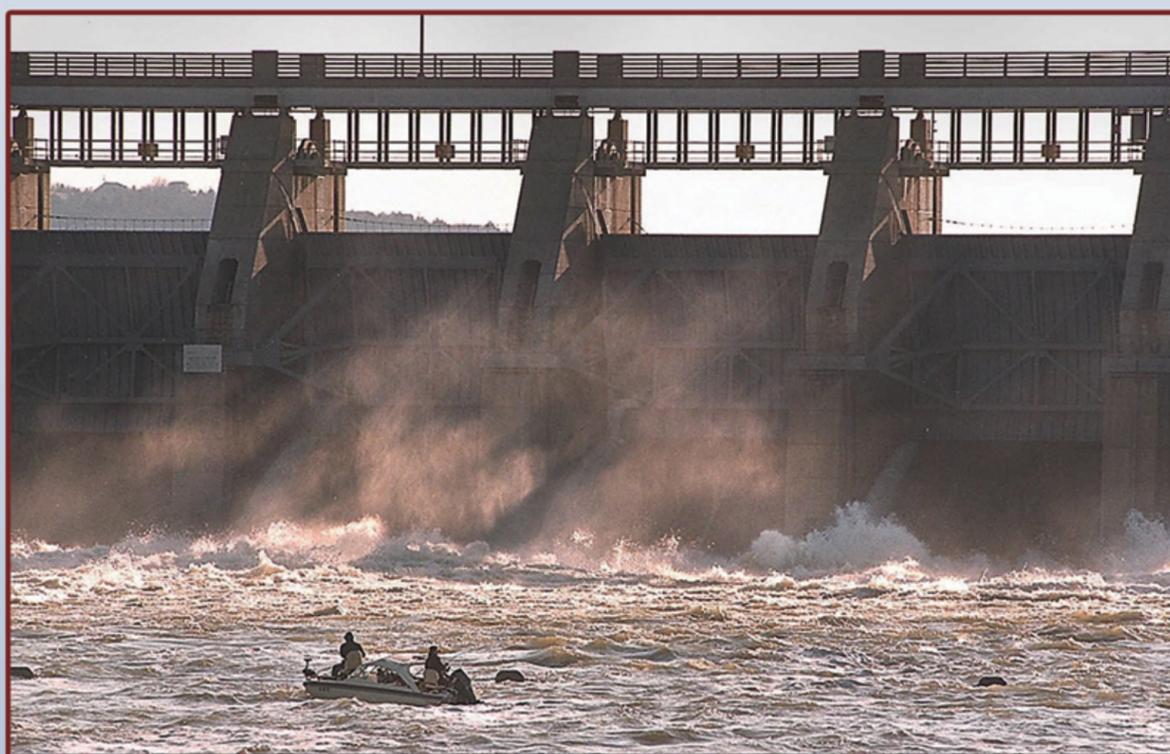
Water tower at Aberdeen.



Water tower at Oacoma.

SOUTH DAKOTA WATER

From the days of Arikara and Sioux villages nestled along the Missouri's shores to today's irrigation systems sprinkling vast fields, South Dakotans have depended on the state's water resources. Sometimes too much – flood! – and often too little, water will always be the essential element shaping life in South Dakota.



Fishing in the waters below Gavins Point Dam.

Photo by Greg Latza, Argus Leader



South Dakota's glacial lakes.

Sunrise over the Missouri, Yankton.

Photo by South Dakota Tourism



Funding provided by the South Dakota Department of Transportation