

U.S. Department of the Interior
U.S. Geological Survey

Geologic Investigations Series I-2760
Sheet 1 of 2
Pamphlet accompanies map
2002

Evolution of the Landscape along the
Clear Creek Corridor, Colorado— Urbanization, Aggregate Mining,
and Reclamation

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Introduction

The landscape along lower Clear Creek, defined for this report as between Golden, Colorado, and its confluence with the South Platte River, has changed and continues to change due to human activity. It is a microcosm of the human impact upon many streams and rivers in the Western Plains of North America. Indeed, the Clear Creek valley landscape has been transformed by the human impacts of mining, settlement, agriculture, major water diversions and reservoirs, transportation, and recreation. There is an increasing demand for infrastructure resources, such as aggregate, energy, and water, due to the expanding metropolitan Denver area. Most of the change has occurred within the last 100 years, accelerating through time and increasing in scale, with reclamation of aggregate resource mines now nearly complete.

Photographs, maps, journals, interviews, and fieldwork were used to examine aggregate mining, site history, ecology, and genius loci (sense of place) from approximately 1900 through 2000 along lower Clear Creek. The two map sheets reduce a complex three-dimensional stream corridor environment into a two-dimensional visual and text description. The authors recognize the limitations of such a methodology but believe it is a starting point for further discussion and research. This study of classic land use conflict may be of use to land planners, industry, and the general public.

Aggregate Mining

Within the study area, the best quality surficial sand and gravel resources are found in the modern flood plain and low terrace deposits. Assuming good operating procedures, “Most environmental impacts associated with aggregate mining are benign . . . The most obvious environmental impact . . . is the conversion of land use, most likely from undeveloped or agricultural to a hole in the ground” (Knepper, 2002, p. 6). This report focuses on six sites (see fig. 30) that contain areas mined and reclaimed by the aggregate mining industry.

Although precious minerals initially drew miners to the region, sand and gravel increasingly became more important economically. The value of Colorado sand and gravel was \$230 million in 2000 (U.S. Geological Survey, 2001). Schwochow and others (1974a) determined more than half of the original sand and gravel deposits along Clear Creek have been lost to suburban, commercial, and industrial growth.

Landform Evolution

Like an artist's canvas, the landscape and views are transformed by mining and other human activities. Few people can detect the presence of reclaimed gravel pits throughout the area. The term "mine reclamation planning" appears to be a misnomer because the sites evolve over time, with society inheriting and changing the landscape, unable to visualize the past or forecast future use 20 years from now. Although aggregate extraction is only one of the land uses that affected the creek morphology in the last century, it is useful to examine because the lessons learned can provide choices in future landscape planning.

History

Our Western culture, society, and individuals have left their imprint upon the landscape, visible at times, unrecognizable at others. Although initial land use in the Clear Creek valley tended to be associated with hunter-gatherers and later gold mining, public policy such as the Land Ordinance of 1785, Homestead Act of 1862, and Doctrine of Prior Appropriation in 1876 helped define the landscape through the rectilinear land survey grid, ranches and farms, and water irrigation, respectively.

Colorado lost people during the mid-1860's and mid-1890's due to gold and silver busts (Noel and others, 1994), while cities along Clear Creek increased from 136,746 residents in 1900 to more than one million people in 2000. The metropolitan area is dependent upon snowmelt in the spring for summer water needs and stores water for municipal use during the rest of the year. Less than half of the Clear Creek water passing through Golden flows into the South Platte River. Future urban growth will require increasing amounts of water and aggregate.

Planners are not always able to connect natural resources with transportation and community planning. Scientists, farmers, realtors, and the general public may become at odds over what is the "best" land use of an area. Colorado culture appears to treat settlement separate from nature, local zoning separate from regional planning, and production of infrastructure separate from the processes of obtaining necessary natural resources.

Wildlife Viewing

The reclamation of sand and gravel pits in the study area provides varied habitat in which wildlife may be seen. The urban landscapes include a mix of native and exotic vegetation: grasslands, cottonwood/ willow woodlands, meadow, marsh, open water, suburban park, light industrial, and residential. Mammals in the Clear Creek corridor include badgers, prairie dogs, deer, beavers, red foxes, muskrats, and raccoons. The badger is a compulsive burrower and over time "a badger settlement becomes a series of small quarries" (The Living Desert, 2002). Birds that inhabit open, dry grasslands include small hawks, numerous songbirds, burrowing owls, and the State Bird of Colorado— lark bunting or prairie lark-finch. The burrowing owl is diurnal and one of the smallest owl species. It nests underground by digging a burrow, or more frequently it takes over a burrow dug by prairie dogs or pocket gophers. Birds such as ducks, great blue herons (the largest heron in North America), belted kingfishers, and red-winged blackbirds are attracted to aquatic habitats. The greenbelt from Prospect Park to Johnson Park (figs. 36 and 43 on sheet 2) offers excellent wildlife habitat (Gray, 1992).

Photo Captions

Figure 5. The Lee residence of Wheatridge, Colorado, built in 1873. (Photograph by D.L. Jarrett in 1961, courtesy Colorado Historical Society. Negative no. 36.764.)

Figure 8 (above). Natural forces shape the Clear Creek landscape. The Golden City and South Platte Railroad Company's bridge across Clear Creek in Golden, Colorado, was swept away by a flood in 1894. Several men and a boy are on the remaining large upright timbers of the bridge. (Courtesy Denver Public Library, Western History Collection.)

Figure 11 (right). Agriculture has also modified the Clear Creek landscape. A dirt road passes by cottonwood trees that surround a fence line and stacked hay in a field. (Photograph by L.C. McClure between 1900 and 1920. Courtesy Denver Public Library,

Figure 20 (right). A variety of Colorado wildlife may be viewed within the study area. Seventy-five percent of wildlife species in Colorado are dependent upon riparian areas, which make up less than 1 percent of Colorado's landmass (State of Colorado, 2000). (Watercolors by Steve Elliott, courtesy Colorado Wildlife Viewing Guide Commission.)

Figure 24. Prospecting party ready for a month-long trip. The discovery of gold in the gravels along Ralston Creek and Clear Creek led to a small population explosion along the Clear Creek flood plain in the late 1850's. (Courtesy Colorado Historical Society.)

Figure 26 (below). Gold dredging in the Clear Creek valley between 1890 and 1910. A hydraulic dredge machine (a floating platform) is in operation. (Courtesy Denver Public Library, Western History Collection.)

Figure 29 (below). View east from the foothills across the braided, sinuous channel of Clear Creek to Golden and on to the plains in about 1900-1910. This photograph by L.C. McClure shows the tree-lined streets of the town, smokestacks of mills and kilns, South Table Mountain, and Castle Rock. (Courtesy Denver Public Library, Western History Collection.)

Figure 30. Map showing best quality gravel deposits and clay, gravel, and stone mine operations within the region, 1920–1998. The six sites selected as specific areas of interest along Clear Creek are also highlighted. These sites are described in detail on sheet 2. Mining occupies one of the smallest amounts of the major land uses in the study area. Approximately 1,240 acres of best quality gravel deposits were mined from 1994 to 1998. The last large gravel reserve in the Denver area extends from the confluence of Clear Creek with the South Platte River to 144th Avenue about 11 miles northeast along the South Platte River (Schwochow, 1980). To aid readability of the map, reservoirs are shown as blue outlines where they overlap gravel pits.

Panoramic Views

A. Panoramic view west showing pasture lands and distant Front Range, photographed in 1910 by L.C. McClure from Inspiration Point in Denver Mountain Park. Inspiration Point (formerly Lookout Point) is a knoll of ground west of Sheridan Boulevard and north of Interstate 70. On the left of the photograph are North Table Mountain and South Table Mountain with the Clear Creek Valley between them. Railway bridges cross Clear Creek and electric power poles follow the interurban railroad trolley lines. Brick commercial buildings and a black water tower are visible in Arvada in the middle of the photo-graph. On the right are the Boulder Flatirons and snow-covered Longs Peak. Clear Creek is visible across most of the frame. (Courtesy Denver Public Library, Western History Collection.)

- B. Soaring growth by 2002 has filled the view of the Clear Creek valley with rooftops, highways, and power poles. Clear Creek is barely visible between two large Colorado blue spruce trees to the left of center. The mountain backdrop appears changeless over human time, but it is not changeless over geologic time. The water tower in Arvada is now painted white, and Interstate 76 cuts across most of the panoramic view.

Map Captions

Figure 7. Map of railroads and roads within the region, 1901–1994 (modified from U.S. Geological Survey topographic maps). The impact of the land grid system is evident in the dense, linear road patterns. The locations of railroads are more subject to physical landscape characteristics than are the locations of the roads. The construction and maintenance of such infrastructure requires local aggregate resources.

Figure 13. Map of Denver urban settlement within the region, 1901–1996/1997 (modified from U.S. Geological Survey topographic maps). Urban growth has impacted Clear Creek, agricultural land use, and the availability of aggregate resources. The urban area expanded to cover 31 percent of the quality aggregate resource by the 1990's.

Figure 18. Map of riparian areas in the Golden and Arvada quadrangles (from the State of Colorado, 2000). (Data for the Commerce City quadrangle were not available.) The U.S. Environmental Protection Agency (1990) considers the Clear Creek watershed to have experienced a moderate level of wetland loss since 1870. In Colorado, riparian areas make up less than 1 percent of the area (State of Colorado, 2000). The stream and its banks are important to people and wildlife. Former gravel pits have been used to create wildlife habitat along parts of Clear Creek.

Figure 23. Map showing the general alteration of stream-channel morphology and water storage in the study area, 1901–1994 (modified from U.S. Geological Survey topographic maps). The contrast between water features in 1901 and 1994 is clear. Note that the 1901 Clear Creek channel appears to be above parts of the southern terrace between present-day Youngfield Street and Harlan Street. This is probably due to field surveying, drafting, or projection errors of the time. The irrigation ditches of 1901 tend to form a grapevine or trellis pattern where water was distributed to agricultural fields. In contrast to 1901, the 1994 irrigation system shows a decrease in channel branching due to the change from agricultural to urban water use.