

Some General Aspects of the Physical Geography of the Southeastern Portion of the Canon City Embayment, Colorado

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Location

The southeastern portion of the Canon City Embayment is situated in south-central Colorado and covers parts of Custer, Fremont, and Pueblo Counties. The north boundary is 38° 23' 45" North latitude; the south, 38° 07' 30" North latitude; the east, 105° 00' 00" West longitude; the west, 105° 07' 30" West longitude. This region, comprising all of the Canon City 4NE and Florence SE topographic quadrangles, covers approximately 128 square miles. Florence, Colorado, situated in the southwestern part of the Florence quadrangle and along the Arkansas River, is the major city in the area.

Climate¹

The climate of the area is a semi-arid, continental temperate type with long, warm summers and short, cold winters. The region, lying in the rain shadow of the adjacent mountains, is characterized by an erratic distribution of rainfall and an abrupt changeability in the weather. The average precipitation is low and the evaporation high; the relative humidity is 52 per cent.

Precipitation in the region is light, with the average over a pine, juniper, and ponderosa pine on the south slopes. Scrub oak, a shrub, is found on the south slopes; grasses include the blue grama, the mountain muhly, wheatgrass, and fescue.

Drainage

Two perennial streams and many ephemeral streams drain the plains section of the study area. The Arkansas River, an eastwardly flowing stream, is the major perennial stream of the region. Hardscrabble Creek, discharging into the Arkansas River from the south, is the other perennial stream.

Ephemeral streams, such as Mineral and Newlin Creek, are powerful erosive agents, particularly in the spring. During the remainder of the year, these streams carry no surface flow except after torrential downpours. Such heavy precipitation of short duration over a limited area may cause rapid runoff to the streams in a short period of time, resulting in destructive flash floods.

Geology

Pre-Quaternary rocks include Precambrian crystalline rocks and Paleozoic and Mesozoic sedimentary rocks. The Precambrian rocks in-

1. No weather station with complete and long-term records is located in the study area. Hence, data on temperature were taken from the Canon City records, data on precipitation from Penrose, and data on wind, relative humidity, and evaporation from Pueblo. Little discrepancy in the records was indicated where comparisons of data could be made with short-term records from Florence.

clude granite and pegmatite which enclose and intrude various gneisses and schists. Paleozoic and Mesozoic rocks consist of marine sandstone, shale, and limestone along with continental conglomerate, sandstone, shale, limestone, and coal.

Alluvium, colluvium, windblown sand, rockslides, and a slump block are the major Quaternary surficial deposits found in the southeastern portion of the Canon City Embayment. In the mountains, alluvial deposits occur along some of the larger streams. Colluvium also occurs in the mountains, but it is generally quite thin. Pleistocene deposits which are quite prominent in this part of the Embayment are of alluvial origin and consist of brown to reddish brown sand and gravel of various sizes. The deposits occur as alluvial covers on pediments, as covers on pediment remnants, and as caps on isolated hills and knobs. Most of the recent deposits is also of alluvial origin and lithologically similar to the Pleistocene deposits; however, these deposits occur as veneers on rock-terraces and as alluvial-fill terraces, all occupying low topographic positions within present stream valleys. Some recent alluvium occurs as remnants of fill within arroyos.

The major geologic structures of the southeastern portion of the Canon City Embayment are the Canon City-Florence syncline, the Wet Mountain anticline (2) and the Wet Mountain fault system (personal communication, John Logan, University of Oklahoma). These structures, along with minor folds and faults, have influenced the geomorphic development of the region.

Geomorphology

Landforms of the study area lie within two physiographic provinces (1): the Canon City Embayment of the Colorado Piedmont section of the Great Plains physiographic province and the Wet Mountains of the Front Range of the Southern Rocky Mountains physiographic province. Within the study area, elevations of the Embayment range from 5,000 to 6,500 feet while those of the Wet Mountains range from 6,000 to 9,600 feet. Major landforms of the region are mountains, affected by Tertiary and is 40 miles per hour. The highest monthly average wind velocity over a 10-year period is 58 miles per hour (January, 1943) while the lowest monthly average is 26 miles per hour (October, 1944). Winds exercise a drying influence on the soils, which are not well supplied with moisture due to low precipitation. Dust devils, small spiral winds, are fairly common, but tornadoes are relatively rare. In Fremont County, mountain-and-valley winds are strong enough to modify the climate considerably.

Vegetation

Vegetation of different and characteristic types occurs in three subdivisions of the study area: (1) the river bottom, (2) the rangelands consisting mainly of pediments, and (3) the mountains. The vegetation of these subdivisions is strongly influenced by the amount of water available, which in turn affects the economic utilization of these areas.

In the river bottoms, water is relatively abundant and some irrigated farming is conducted. Vegetation consists of the plains cotton-

wood, tamarack, and willow, and introduced pasture grasses such as orchard grass, timothy, fescue, crested wheatgrass, tall wheatgrass, clover, alfalfa, and brome.

On the rangelands, water is scarce and the vegetation is mainly xerophytic. Vegetation includes pinyon pine and juniper, shrubs such as the yucca, prickly pear, tree cactus, sagebrush, rabbitbrush, scrub oak, greasewood, and salt brush, and grasses such as the buffalo, blue grama, and the mountain muhly.

In the mountain, water is somewhat more plentiful, and spruce (wet sites) and Douglas fir are found on the north slopes, and pinyon 31-year period slightly above 12 inches annually (table 1). Slight rainfall combined with the high summer evaporation rate (maximum average evaporation rate, July with 10.9 inches) places the climate well within the semi-arid type. Maximum average rainfall occurs between April (1.40 inches) and August (1.80 inches). Extreme maximum precipitation for a 10-year period was 6.25 inches (August) and the extreme minimum, 0.01 inches (November). Winter precipitation is mainly snow which lingers in the mountains until the spring thaw. Some hail, accompanied by strong winds, may occur in the summer. Within the area, precipitation varies, with the greatest amount in and adjacent to the mountains and the least amount in the plains.

Temperature extremes occur within a relatively short period of time. The average annual temperature over a 31-year period is 54.5°F. (table 1). The maximum monthly temperature occurs in July (73.3°F.)

TABLE 1
Composite Record of Average Precipitation and Temperatures
for the Southeastern Portion of the Canon City Embayment
for a Thirty-one Year Period
(From records of the U. S. Weather Bureau)

Period	Precipitation ¹ (inches)	Temperature ² (°F)
January	0.35	36.7
February	0.39	38.5
March	0.65	42.9
April	1.40	52.1
May	1.86	60.7
June	1.14	70.1
July	1.71	73.3
August	1.80	72.2
September	0.88	67.0
October	0.77	56.2
November	0.49	44.7
December	0.60	39.1
Annual	12.04	54.5

1. From Penrose Station.

2. From Canon City station.

and the minimum in January (36.7°F). The extreme maximum temperature for a 20-year period was 107°F. (July) and the extreme minimum —16°F. (January and February).

The average date of the first killing frost is October 10 while that of the last is May 10. The average number of days without killing frosts is approximately 120 days (3). The average annual frost penetration is approximately 20 inches, with the extreme frost penetration ranging as high as 35 inches.

Winds blow mainly from the northwest and west, with occasional winds from the north and southwest. Spring and winter are the periods of maximum wind. The average annual maximum wind velocity over a 10-year period Quaternary erosion, and hogbacks, pediments, terraces, canyons and valleys, which have been either influenced or produced by Quaternary erosion controlled by rock hardness and geologic structure.

One of the most conspicuous landforms of the study area is the pediments. Six pediments and an intermediate surface of one of the higher and older pediments are recognized, ranging in age from probable early to late Pleistocene. These surfaces truncate the soft shale of the Smoky Hill and Pierre formations of Cretaceous age. Present-day older surfaces are only a vestige of once extensive pediments which were gradually reduced in areal extent by stream erosion in the later Quaternary.

The pediments are associated with three drainage systems; Hard-scrabble-Low Back Creeks, Adobe-Mineral-Newlin Creeks, and the Arkansas. The highest and oldest pediment of the drainage systems lies between 320 and 420 feet above modern stream level; the next oldest, with its intermediate surface at 280 feet, occurs between 220 and 240 feet above modern stream level; the remaining four occur between 160 and 180 feet, 100 and 120 feet, 70 and 90 feet, and 40 and 50 feet, respectively, above modern stream level. The slopes of the pediments, as estimated from the slopes of their alluvial cover, are variable, ranging from a maximum of 250 feet per mile at the headward portions of some pediments to a minimum of 75 feet at their distal ends. The pediment covers, consisting of coarse alluvium deposited by streams, are variable in thickness with an average thickness of approximately 10 feet. The origin of the pediments is ascribed primarily to lateral corrosion by streams with slope retreat caused by weathering and mass wastage of the valley walls considered to be a secondary contributor to pediment development.

Literature Cited

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