

Canyon Encyclopedia Article

Canyon

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Canyon

A canyon is a narrow, steep-walled, and deep valley with or without a perennial stream at the bottom. It is larger than, but otherwise similar to, a gorge. Canyon walls are commonly composed of **bedrock** with little or no **regolith** and those with nearly vertical walls, particularly in the southwestern United States, are often referred to as slot canyons.

Canyons are characteristic of high plateaus and mountainous regions that have experienced rapid tectonic uplift, for example the Colorado Plateau physiographic province of the southwestern United States. As a region is raised due to tectonic activity, streams will adjust themselves to the change by cutting deeper valleys. Rising or falling sea levels, particularly during glacial periods, can also affect stream incision rates and valley shapes although generally not to the same degree as tectonic activity.

Canyon formation is common in arid and semi-arid climates because bedrock weathers slowly in the absence of **water**. Therefore, canyon-forming streams are able to cut vertically much more rapidly than their valleys can be widened by **mass wasting** or other erosional processes. A canyon eroded into relatively uniform bedrock, for example the Grand Canyon of the Yellowstone River or the Black Canyon of the Gunnison River, will have a generally uniform valley wall profile with no abrupt changes in slope.

Canyons eroded into layered rocks with differing degrees of resistance to **erosion**, however, will have irregular or stair-stepped valley wall profiles. This is the case in the Grand Canyon in Arizona, where hard **sandstone** and **limestone** layers, as well as the metamorphic rocks of the inner gorge, form steep cliffs whereas softer shale layers form gentle slopes or benches.

Rivers running through canyons are unable to develop broad **floodplains** because they are not free to migrate laterally and deposit alluvium. Stream terraces, where they do occur, are likely to be highly localized and discontinuous. Most of the sediment delivered to canyon bottoms arrives by mass wasting processes such as **rockfall** or by debris flows when rockfall debris along side channels is mobilized during rainstorms. Rockfall accumulations and alluvial fans formed when debris flows enter the main canyon can in turn restrict stream flow and create the alternating pools and **rapids** characteristic of many canyons.

See Also

Alluvial System; Bedrock; Channel Patterns; Drainage Basins and Drainage Patterns; Landscape Evolution; Rapids and Waterfalls; Rivers; Stream Valleys, Channels, and Floodplains