Geology of the Cubberla Creek and Witton Creek Catchments

by Rod Brown

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Abstract

The catchments of Cubberla and Witton Creeks are underlain mainly by Bunya Phyllite and Neranleigh-Fernvale Beds. These metamorphic rocks were originally deposited as muds, silts and sands on a deep ocean floor some 370 million years ago. The sediments were transformed by the pressure and heat associated with massive earth movements during the Permian Period, resulting in the formation of a high mountain chain which constituted the east coast of Australia at that time. These mountains were intruded by molten magma in the Triassic Period which slowly cooled to form coarse granite bodies, examples of which can be seen to the north of the catchments. The magma formed narrow bands of fine-grained volcanic rock known as dykes where it intruded zones of weakness in the overlying metamorphic rock. Numerous outcrops of these occur in the Cubberla and Witton Catchments. For the past 200 million years, the mountains extending northwards from the present day catchments of Cubberla and Witton Creeks have been eroded, with rivers and streams flowing to the west and south during the Triassic and Jurassic Periods and depositing sediments into the Ipswich and Clarence-Moreton Basins. The catchments were not directly impacted by the vulcanism which occurred in the mid Tertiary throughout much of south east Queensland.

Geology of the Catchment

The rocks of the Cubberla and Witton Creek Catchments span more than 370 million years of geological history. Most of the area is underlain by fine grained metamorphic rock known as the Bunya Phyllite (see Geological Map - **Fig.1**), with coarser grained metamorphic rocks, the Neranleigh-Fernvale Beds, occurring along the south western margin of the Cubberla Creek Catchment. These older metamorphic rocks were intruded by fine-grained volcanic rocks in a number of areas.

Erosion of the headwaters of the creeks has resulted in the deposition of alluvium in their lower reaches, particularly in low-lying areas at the junctions with the Brisbane River.

Geological History

The Bunya Phyllite was formed from sediments deposited in deep oceanic waters during the late Devonian and Carboniferous Periods, some 370 to 290 million years ago. During this period, the east coast of Australia lay to the west of Dalby and consisted of a lofty chain of volcanic mountains (**Fig. 2**). The oceanic plate, to the east of Australia, was moving westward and being subducted beneath the continent.

A shallow sea occurred over the continental shelf which was approximately 100 km wide and extended in a north-west south-east direction. In our region, the shallow sea would have extended from about 50 km west of Toowoomba to about Marburg. The ocean deepened rapidly from the edge of the continental shelf in an easterly direction. Sand and mud were washed down the rivers from the volcanic mountain chain and deposited on the continental shelf, some of which was carried by currents down submarine canyons onto the deep ocean floor in the vicinity of the present day Cubberla – Witton area. These sediments were deposited together with slowly accumulating mud from other sources and the remains of marine organisms (**Fig. 3**).

The western margin of the Cubberla Creek Catchment is underlain by the Neranleigh-Fernvale Beds that are believed to be similar in age to the Bunya Phyllite. The finer grained part of the sequence is classified as Bunya Phyllite (that is, the original deposits were mainly muds and silts) while the more coarse-grained part of the sequence is classified as Neranleigh-Fernvale Beds. These were originally sandstones and interbedded shales. Highly weathered outcrops of the Neranleigh-Fernvale Beds occur at the southern end of Bielby and Cedarleigh Roads while good exposures of Bunya Phyllite occur in road cuttings at the northern end of Bielby Road and along the road leading up to the small reservoir near the end of Fleming Road.

Fig. 1 Geological Map Extract from: *City of Brisbane, Geological Map Sheet 4.* Geological Survey of Queensland. Publication No. 323, 1965 Queensland Department of Mines and Energy.

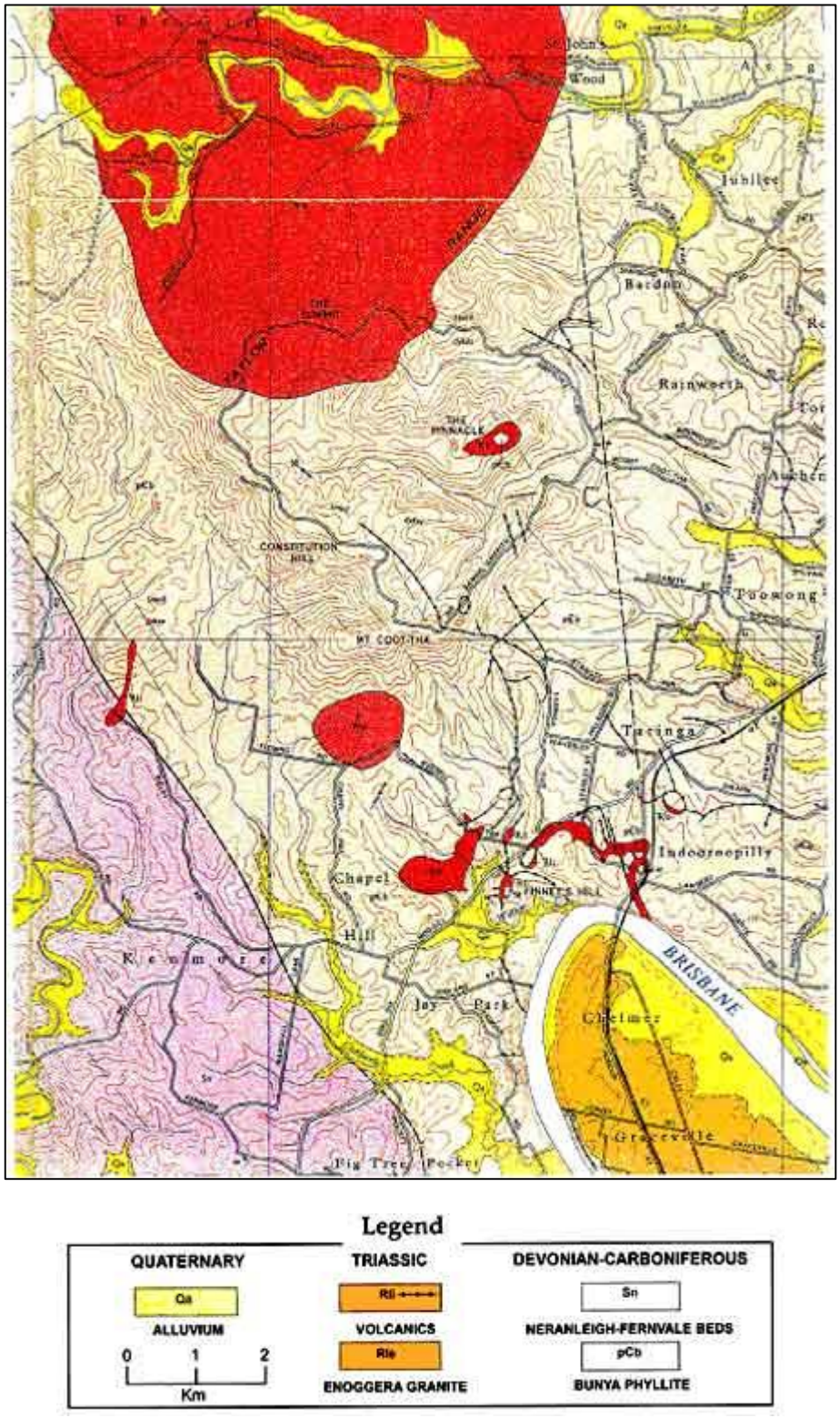


Fig. 2 South East Queensland about 370 million years ago (late Devonian Period). *(Source:* Willmot, W. and Stevens, N. 1992. Rocks *and Landscapes of Brisbane and Ipswich)*

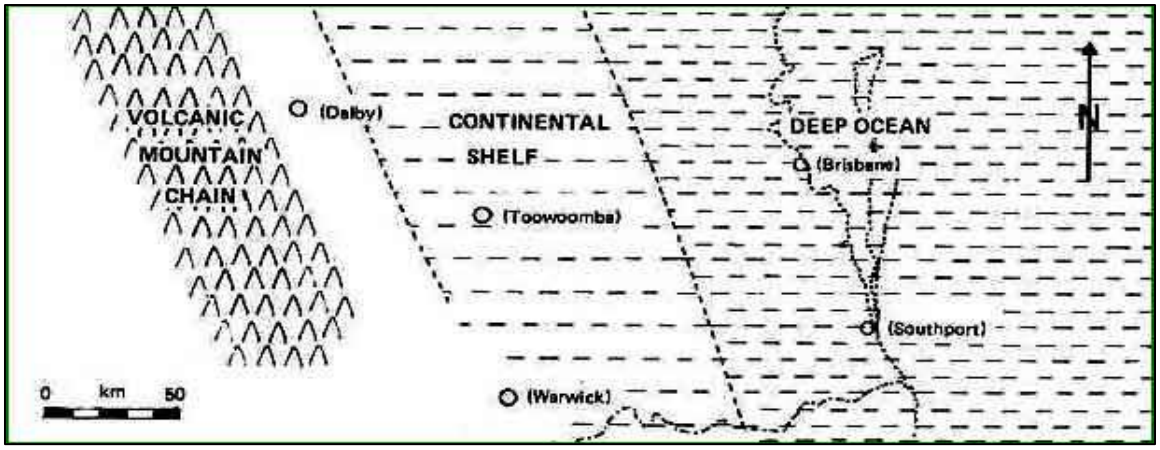
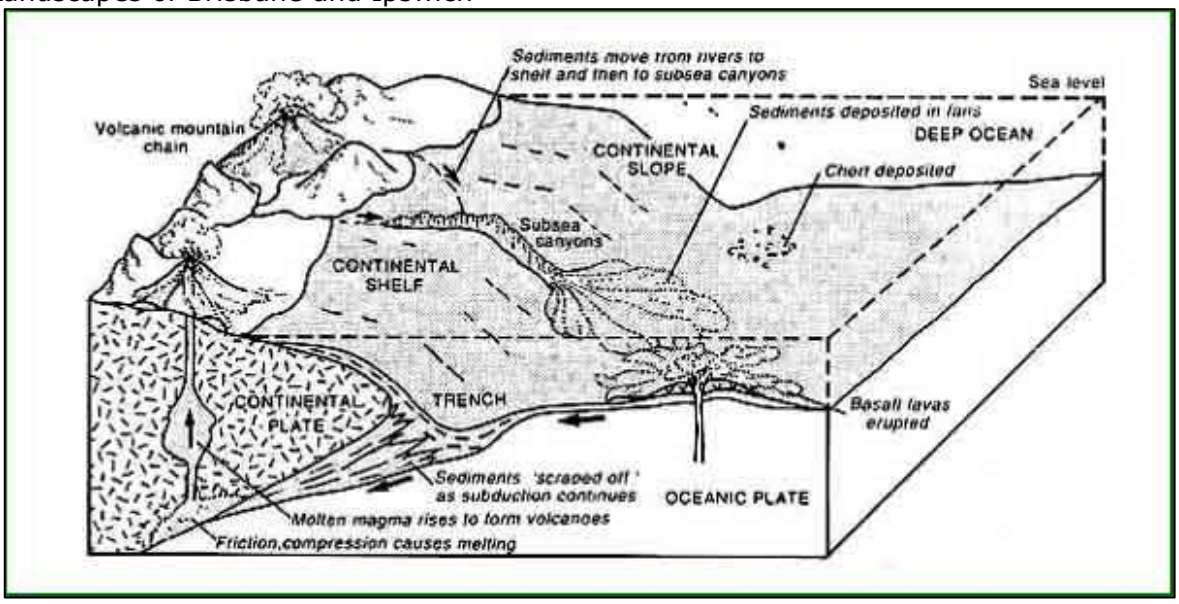


Fig. 3 *South East Queensland 370-290 million years ago (late Devonian to Carboniferous Periods).* (Source: Willmot, W. and Stevens, N. 1992. Rocks and Landscapes of Brisbane and Ipswich



During the Permian Period (290-240 million years ago), the Bunya Phyllite and the Neranleigh-Fernvale Beds were uplifted and contorted to form a mountain range which became the eastern margin of Australia (**Fig. 4**). Molten rock was intruded into these coastal mountains during the Triassic Period (240-220 million years ago); some of which cooled slowly deep below the land surface to form coarse crystalline granite bodies. These granites can be examined in the Gap Quarry and at small outcrops near the Mt Coot-tha television stations. In places, the molten magma reached the land surface, resulting in the formation of volcanoes and the expulsion of lava and ash (**Fig. 5**). Where this happened, the lava solidified quickly into fine-grained rocks.

Fig. 4 South East Queensland 290-240 million years ago (Permian Period). *(*Source*: Willmot, W. and Stevens, N. 1992.* Rocks and Landscapes of Brisbane and Ipswich*)*

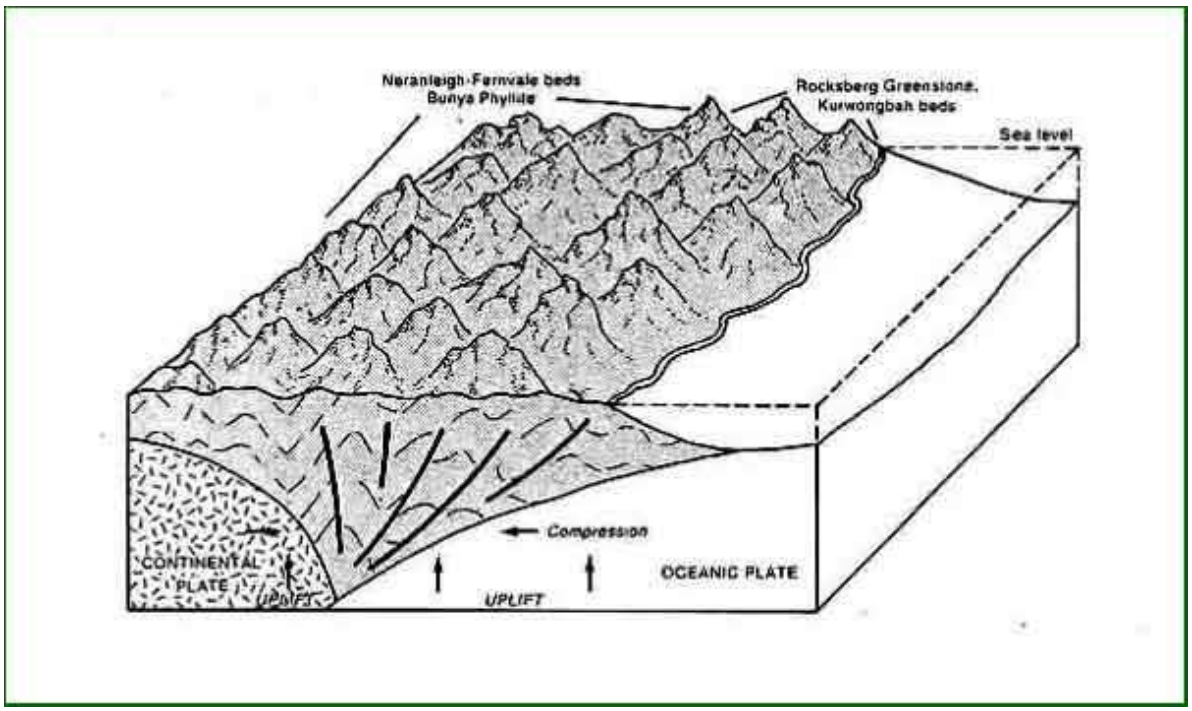
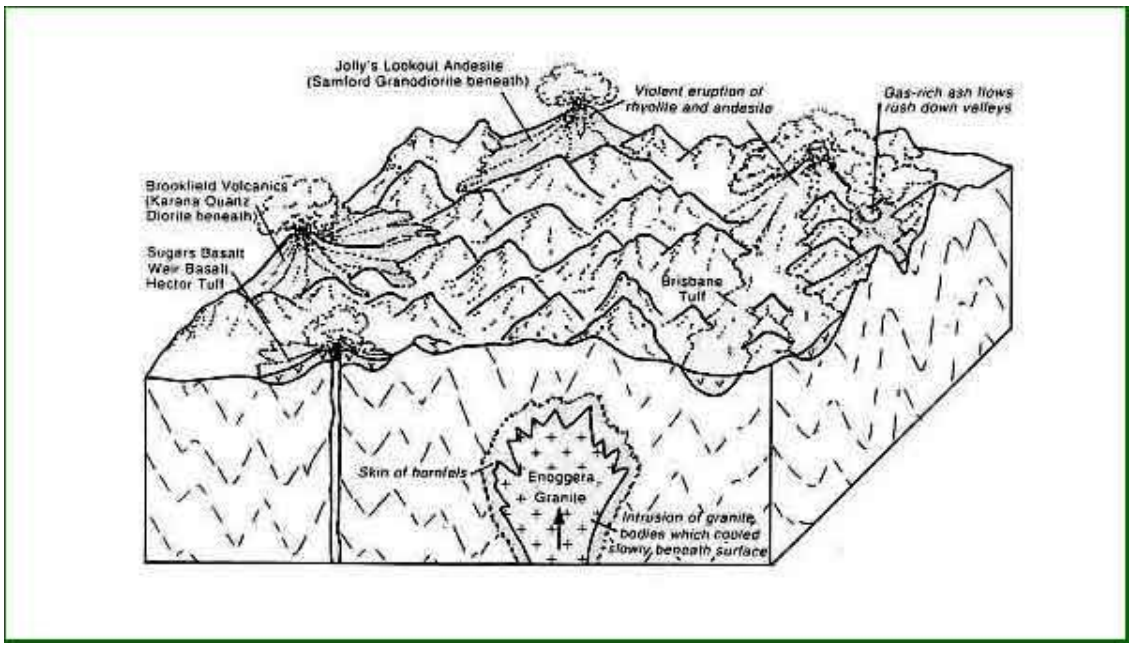


Fig. 5 South East Queensland 240-220 million years ago (Triassic Period). (*Source*: Willmot, W. and Stevens, N. 1992. *Rocks and Landscapes of Brisbane and Ipswich)*



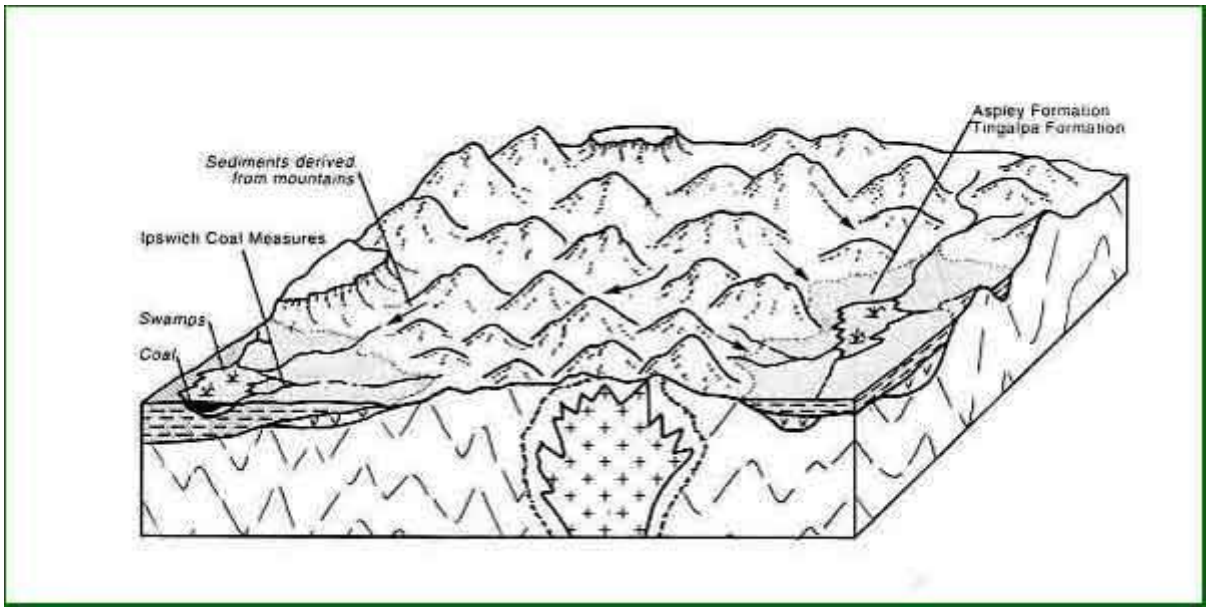
The geological map of the City of Brisbane published by The Geological Survey of Queensland in 1965 shows an isolated outcrop of the Enoggera Granite covering an area of approximately one square kilometre in the Cubberla Creek Catchment where Mt Coot-tha Park Estate now occurs. Only a scattering of generally fine-grained volcanic rock can be found in this area, with the main rock type being highly weathered Bunya Phyllite. Narrow bands, known as dykes, comprise light coloured, fine-grained volcanic rock, which intruded the Bunya Phyllite in the Cubberla Creek Catchment. An example is at the northern end of Bielby Road.

Outcrops of volcanic rock also occur throughout the Witton Creek Catchment. Many have been removed as a result of residential and commercial development. A good example at the junction of Moggill Road and Russell Terrace, along the boundary of Indooroopilly State School, has unfortunately been covered with a bluestone (hornfels) wall. Hornfels is a hard metamorphic rock that resulted from the transformation of the Bunya Phyllite by the intense heat from the molten Enoggera Granite. Hornfels is quarried by the Brisbane City Council next to the Mt Coot-tha Botanical Gardens and is used mainly as road metal. The hornfels contains numerous quartz veins that were derived from the quartz-rich molten granite. Outcrops of hornfels occur near the eastern perimeter of the Witton Creek Catchment, in cuttings through Bunya Phyllite on the Centenary Highway between Moggill Road and the Mt Coot-tha Botanic Gardens. The presence of hornfels indicates that the Enoggera Granite lies close to the present land surface in this area. Volcanic rock from this period can also be seen to the west of the Cubberla -Witton Catchments at Brookfield.

During Devonian to Permian times, Australia was part of Gondwana, the mega-continent that included South America, South Africa, Antarctica and India. During this period, the continent was drifting southward. By the late Carboniferous to early Permian, Gondwana lay close to the South Pole and more than half of Australia was covered by a continental ice sheet. The mountains that occurred in what is today the Cubberla-Witton Catchments area would certainly have been snow capped and the home of a very different flora and fauna.

Rivers and streams flowed westward during the late Triassic to mid Jurassic Periods (220-180 million years ago), eroding the high mountains which extended from the Cubberla-Witton Catchments northwards beyond Mt Glorious, and depositing sands and gravels into the Ipswich Basin (**Fig. 6**). It is believed that this mountain range may have been as high as the present day Andes of South America. In low-lying areas, lakes were formed, into which muds and the remains of abundant plant material accumulated. As the sedimentary basin subsided beneath the earth's surface, the heat and pressure transformed the layers of plant matter into coal which has been mined by both open cut and underground methods in the vicinity of Dunmore and Ipswich. The Australian continent drifted northwards during the Triassic, resulting in the climate becoming progressively warmer and drier.

Fig. 6 South East Queensland about 220 million years ago (late Triassic Period). (*Source*: Willmot, W. and Stevens, N. 1992. *Rocks and Landscapes of Brisbane and Ipswich*)



The Jurassic period witnessed the break up of Gondwana and the continuing northward drift of the Australian continent. During this period, sands and silts were eroded from the mountainous region which included the Cubberla-Witton area and were deposited in low lying areas to the west and south, in what is called the Clarence-Moreton Basin. As in the Triassic Ipswich Basin, plant matter accumulated in lakes to form the Walloon Coal Measures.

The Tertiary Period (65-2 million years ago) was a time of erosion in the Cubberla-Witton Catchment. This era of comparative stability was dramatically changed in the mid Tertiary throughout Eastern Australia, and in particular South East Queensland, when an episode of intense volcanic activity occurred. Vulcanism occurred along what is now the Great Dividing Range and the Queensland - New South Wales border. Volcanic rock was intruded in the Fassifern Valley, the Glass House Mountains and at Flinders Peak south of Ipswich, where Tertiary volcanoes intruded the older Triassic vents. Volcanic activity did not occur in the Cubberla-Witton Catchment; however it would have been quite visible from the tops of the ridges in the area.

Topography

The current landscape of the Cubberla and Witton Catchments is a function of geology, climate and time. The once high mountain chain was gradually eroded over a 200 million-year period to form the relatively low hills and ridges of the present day.

The hardness of the Bunya Phyllite and Neranleigh-Fernvale Beds compared to the softer sediments of the Ipswich Coal Measures and Clarence-Moreton Basin has contributed to the Cubberla-Witton Catchments and areas to the north being of higher relief than surrounding regions. The lack of distinct, well-defined bedding in the Bunya Phyllite has resulted in erosion being quite random, without a distinctive, regular drainage pattern developing. While erosion continues to occur at the headwaters of the creeks at the present day, alluvium is being deposited in the lower reaches, especially near where Cubberla and Witton Creeks enter the Brisbane River. This rich alluvium hosts a markedly different flora from that of the stony ridges that constitute most of the two catchments.

Mining Activity

Mining has taken place in and around the Cubberla-Witton Catchments. Gold occurs in quartz lenses and in fault zones cutting through the Bunya Phyllite in many places in the Mt Coot-tha region. Numerous shafts were sunk during the late 1800s and early 1900s in search of gold. These efforts met with little commercial success.

Silver and lead were mined on Finney's Hill between 1918 and 1929. The abandoned mine has been used as a training centre by the University of Queensland for its students of mining engineering since the 1950s. The silver-lead ore is associated with the Triassic volcanic rock.

Conclusion

The Cubberla and Witton Creek Catchments have had an interesting and varied geological history dating back more than 370 million years. Deep oceans to high mountains have occurred in the area. Climatic changes have been extreme - from polar conditions to a sub-tropical land with a prolific and diversified flora and fauna. The currently stable land mass was once the site of active volcanoes and earthquake activity. Miners were once busy searching for the elusive mother lode that could change their fortunes. The subdued hills and shallow creeks of the present day contrast markedly with their ancestral past.

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Source: Robin Trotter (ed.), *Cubberla and Witton Creeks, Their physical characteristics and land use over time, Proceedings of Symposia held in 2000 and 2001 on the Cubberla and Witton Creek Catchments,* 2001 Brisbane, Cubberla-Witton Catchments Network.