

草嶺地質公園網站：

<http://lab.geog.ntu.edu.tw/lab/r605/caoling-geopark.html>



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## 草嶺地質公園

雲林縣古坑鄉的草嶺村擁有豐富的自然景觀資源，長期為國內重要休閒旅遊地點之一，惟九二一地震重創了當地居民生計及休閒產業之發展。期使當地能恢復以往之榮景，行政院農業委員會建立草嶺地區之特殊地景、植物與動物等相關資源的基礎資訊，並訓練草嶺地區解說人力，推動生態保育為主軸之休閒旅遊目標，以落實草嶺地區生態環境資源之永續利用。

配合國際地景保育之發展趨勢，草嶺村於民國93年11月18日舉行設置「草嶺地質公園」的揭牌儀式。林務局於今年度選取「草嶺地質公園」做為推動臺灣地區設置地質公園的示範區之一，除致力於地景資源保護和環境教育之外，並發展地景旅遊為主體的休閒旅遊形式，以促進草嶺地區的社經發展。



「草嶺地質公園」於民國93年11月18日正式揭牌

## 新草嶺潭淤積地景

新草嶺潭與草嶺山崩有著密不可分的關係，主要因山崩物質阻塞河床形成天然壩，其後方河道則蓄水成湖，在國內常稱為「堰塞湖」。



逐漸淤積縮小的新草嶺潭風光

新草嶺潭於2004年7月2日因下方土壩潰堤而消失，清水溪重新下切淤積的河床，呈現快速變遷中的河流地景。

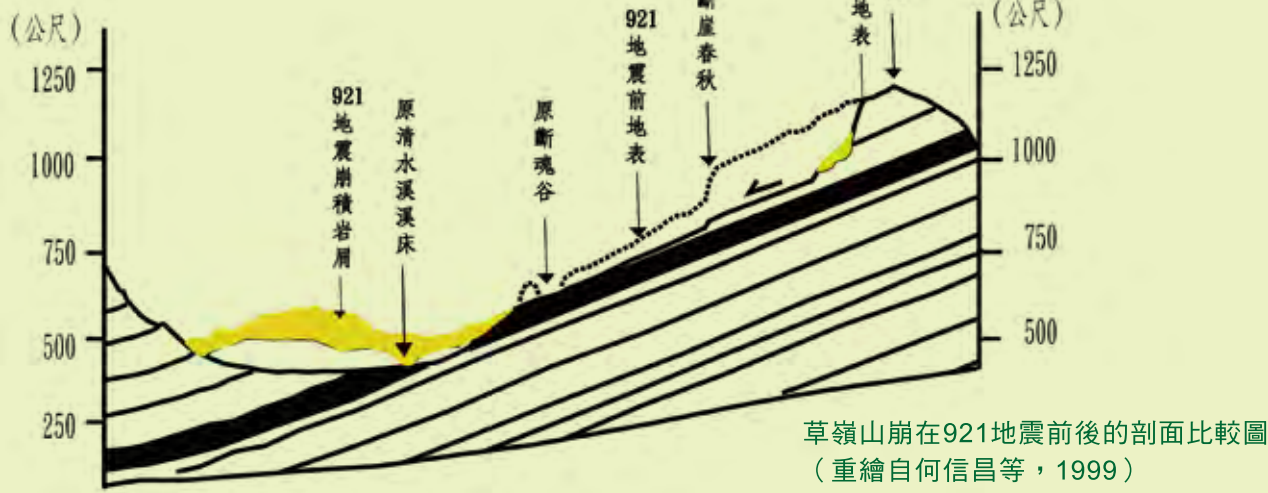


清水溪重新切蝕新草嶺潭的淤積地景

## 草嶺山崩

草嶺經歷五次大規模山崩，多次形成堰塞湖。雖然每次山崩和堰塞湖潰堤均造成重大災難，但也造就了草嶺的特殊景觀而聞名於全球。

草嶺多次發生山崩的原因，包括地形（順向坡）、岩性（砂頁岩互層，產生不連續面）、地質構造（節理發達，加速水分入滲）、河床坡腳侵蝕（上方岩體失去支撐）、降雨（加速風化作用，降低岩層剪力強度）和位於嘉南地震帶上等。



草嶺山崩自921地震後持續發生崩塌



草嶺山崩堆積於河床的崩積物不斷地受到沖蝕

## 幽情谷

幽情谷是一處以急湍、小瀑、深切曲流、幽靜的原始叢林而聞名的景點，主要是受到岩性與地質構造影響所形成的。在河谷兩旁也可見到壺穴和生痕化石等小地景。



幽情谷的急湍、小瀑和深切曲流

## 水濂洞瀑布



水濂洞瀑布及其下方的水濂洞

水濂洞瀑布高約20m，屬於懸谷式瀑布，主要是因為清水溪下切的速率高於支流所形成的瀑布，瀑布下方的凹洞為水濂洞，曾被新草嶺潭所淹沒，但目前已再度出露。

## 草嶺山崩的歷史記錄

日期	天然壩高	滑動體積 (立方公尺)	導因	草嶺潭的發展
1862, 6, 6	不詳	不詳	地震	1898年潰堤
1941,12,17	70 m	>100,000,000	地震	1942,3,14開始溢流
1942, 8, 10	170 m	>150,000,000	豪雨	1951,5,18潰堤
1979, 8, 15	90 m	>5,000,000	豪雨	1979,8,24潰堤
1999, 9, 21	50 m	>120,000,000	地震	2004,7,2潰堤

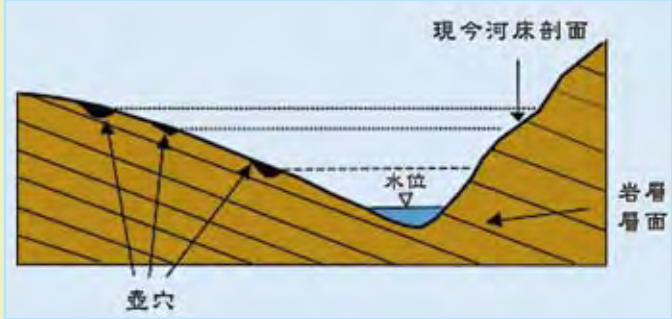
## 石壁仙谷

壺穴是因急流中常挾帶有砂、礫石等，逐漸挖鑽和磨蝕岩床而產生的圓形凹穴。石壁仙谷是一片裸露的傾斜大窩砂岩岩壁，河流大致順著岩層的走向流動，在此河床岩壁上即可見到各種不同形貌的壺穴地景。



石壁仙谷的大岩壁及其上的壺穴群

草嶺地區的壺穴，因河流水量的變化，在空間上呈現出不同高度的壺穴群，這是臺灣地區少見的狀況，在石壁仙谷和連心池均可欣賞到此類特殊的壺穴群地景。



石壁仙谷水位變化與壺穴空間分布示意圖

## 樟湖貝化石密集層

樟湖貝化石密集層位於內湖溪注入清水溪的裸露河床上，厚約30公分。貝類化石以海扇貝類含量最為豐富，同時也有海膽、單體珊瑚、有孔蟲和生痕化石。



樟湖貝化石密集層的海扇貝化石

## 蓬萊瀑布



蓬萊瀑布近景

蓬萊瀑布位於竹篙水溪的中游，瀑高約有30m，水量充沛，沿著峭壁懸空而下，氣勢萬千。從草嶺往瑞里的途中，即可見到此懸掛於山壁之間的瀑布。

## 連心池

連心池是位於岩石河岸上的壺穴群，在空間上也呈現出不同高度的排列。但因此處岩層的傾斜角度較小，故發育出較大且深的壺穴，與石壁仙谷的壺穴有所差異。



連心池的壺穴群

## 連珠池

連珠池的壺穴群為草嶺地區規模最大者，主要是流水順著岩層的節理發育而成，有如串連的珍珠般，故稱之為連珠池。



連珠池的壺穴群成串有如明珠而得名

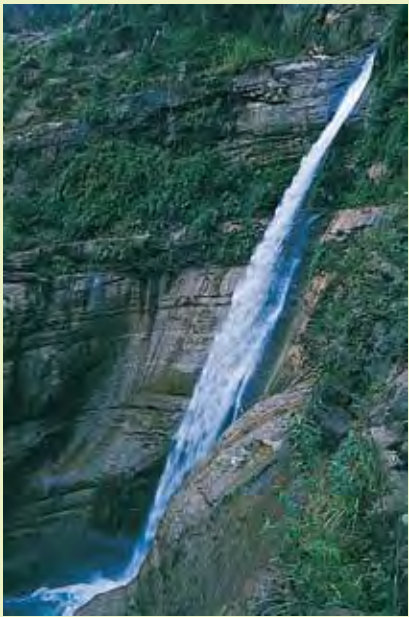
## 萬年峽谷

萬年峽谷地區的河谷由傾斜岩層面所構成，內湖溪（石鰻坑溪）逐漸切蝕岩床而形成此特殊的峽谷地景。在此處同時可欣賞到化石和石灰華等小地形景觀。



內湖溪深切傾斜岩層而形成的萬年峽谷

## 同心瀑布



同心瀑布的水流非常壯觀

同心瀑布位於內湖溪主流的河床上，為典型的帽岩瀑布，落差約30m，加上水量豐沛，氣勢相當磅礴，其下方有深達2m以上的瀑下深潭。

## 連心池瀑布

在連心池的正下方有落差約5m的瀑布，其下方有一50cm深的淺潭，在地形學中稱為「瀑下深潭」，主要因瀑布水流長期衝擊而形成的撞擊穴。



連心池下方的連心池瀑布和瀑潭景觀

## 遊龍奇景



此裸露河谷順著大窩砂岩層的傾斜坡發育而成，並在河道中間形成多處的壺穴地景，加上兩岸植被覆蓋茂密，為一處極佳的賞幽之所。

溪流如遊龍戲水般的飛洩而下

## 青蛙石地景

青蛙石因狀似青蛙而得名，主要因岩層層理和節理構造的影響，在自然作用下所形成的地景。



青蛙石的造形特殊足以媲美野柳的女王頭

## 多孔狀岩和鐘乳石地景

「多孔狀岩」是指表面遍布孔穴的岩石或裸露岩體，主要是由風化作用所形成的地景。青蛙石下方的垂直崖壁，可見大小不一、密密麻麻的孔狀風化地景。

臺灣各山區常有發現鐘乳石的記錄，草嶺也有正在發育成長中的鐘乳石小地景。



青蛙石下方的多孔狀岩和鐘乳石地景



Caoling Geopark



Geodiversity Information



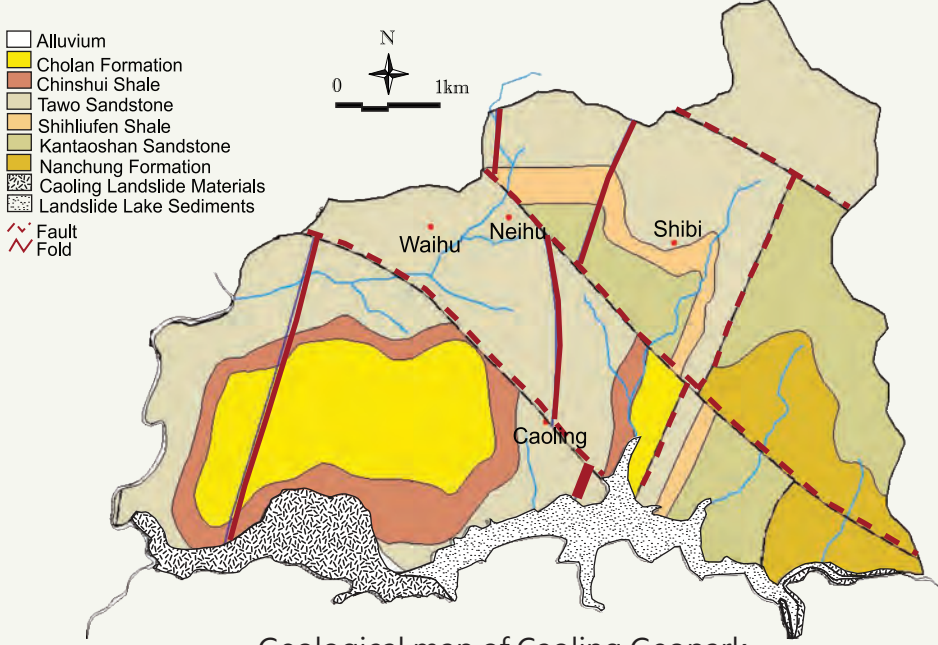
Forestry Bureau, Council of Agriculture, Executive Yuan  
<http://www.forest.gov.tw/mp.asp?mp=3>  
Yunlin County Government  
<http://www.yunlin.gov.tw/>  
Department of Geography, National Taiwan University  
<http://www.geog.ntu.edu.tw/english/index.html>  
Caoling Geopark Website  
<http://lab.geog.ntu.edu.tw/lab/r605/caoling-geopark.html>



Caoling Geopark is located in Gukeng of Yunlin county, and is on the border of Chiayi county and Nantou county.  
Due to its abundant natural landscape resources, Caoling area has been one of the most famous scenic areas in Taiwan for a long time. Some of which are extremely unique comparing to other places in Taiwan or even around the world. In order to protect these assets and to execute geoconservation actions, Caoling Geopark has been established in 2004.



Caoling area is mainly underlain with sedimentary rocks of the late Miocene and Pleistocene ages. Five faults and four folds structure lines pass through and dissect here; therefore the terrain is rugged, and the surface is fragile to soil erosion and landslide.



Geological map of Caoling Geopark



1. Caoling Landslide

Caoling Landslide is the most well known disaster in the Caoling area. On the other hand, it has thus become the most attractive spot for tourists.

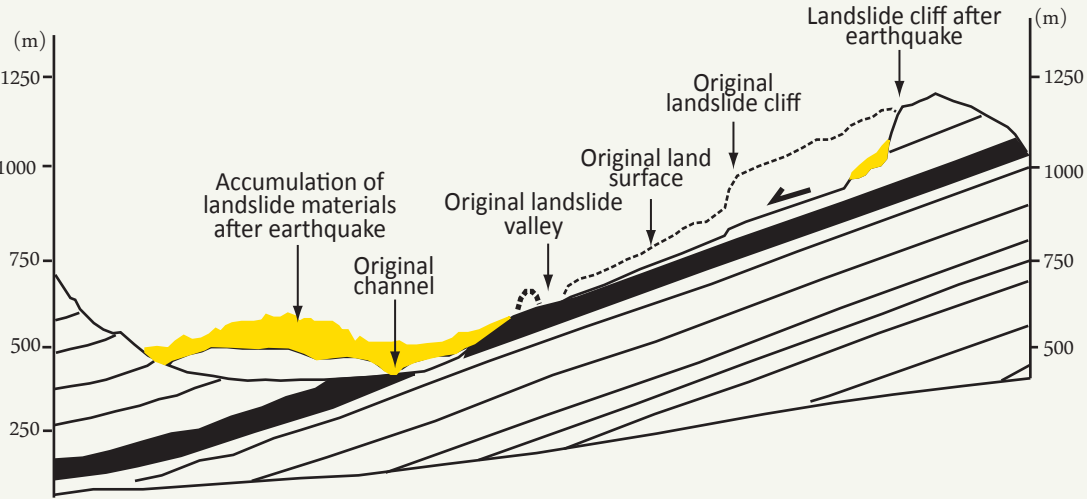


Based on historic records we know 5 big landslide events had occurred in Caoling since the 1862. All of them were either caused by earthquake or rainstorm.

Historic records of Caoling landslide and disappearance of landslide lake (Huang et al., 1983; Ho et al., 1999)

Date	Height of landslide dam (m)	Volume of landslide materials (m <sup>3</sup> )	Casues	Disappeacne of landslide lake
1862.06.06	?	?	earthquake	1898
1941.12.17	70	>100,000,000	earthquake	
1942.08.10	170	>150,000,000	storm	1951.09.18
1979.08.15	90	>5,000,000	storm	1979.08.24
1999.09.21	50	>120,000,000	earthquake	2004.07.02

The latest Caoling landslide that occurred in the 1999 Chi-Chi Earthquake had changed the original landslide surface. More than 120 million tons of landslide material accumulated on the Cingshuei Creek valley to form a natural dam, gradually creating the New Caoling Lake (新草嶺潭).



Comparison of Caoling Landslide area profiles before and after the Chi-Chi Earthquake in 1999 (redraw from Ho et al., 1999)

After the Chi-Chi Earthquake, Caoling Landslide area is not very stable; various small scale landslides happens constantly. The new landslide cliff is still moving downward, and rock fall is occurs frequently.

The 921 National Earthquake Memorial Site consists mainly of the Caoling landslide area and was set up in 2005. The main goal of this area is to protect the safety of residents and visitors from the unstable terrain.



Location of geosites

1. Caoling Landslide / 草嶺山崩
2. Caoling Landslide Lake Sediments / 新草嶺潭淤積河床
3. Huge Cliff / 峭壁雄風
4. Miniature landscapes / 小地景：  
Frog Rock / 青蛙石  
Caverns landscape / 多孔狀岩  
Stalactite landscape / 鐘乳石
5. Shuilien Cave Waterfall / 水濂洞瀑布
6. Penglai Waterfall / 蓬萊瀑布
7. Lianxinchu Waterfall / 連心池瀑布
8. Tongxin Waterfall / 同心瀑布
9. Jhanghu Fossil Layer / 樟湖貝化石密集層
10. Shibi Pothole / 石壁仙谷
11. Lianxinchu Pothole / 連心池
12. Lianzhuchi Pothole / 連珠池
13. Youqing Valley / 幽情谷
14. Dragon Valley / 遊龍奇景
15. Ten Thousand Year Gorge / 萬年峽谷



Three erosion gullies, greater than 2 m in depth, have formed on the Caoling landslide surface



New landslide valley occurs on the Caoling landslide surface due to parallel landslide





2. New Caoling Lake

New Caoling Lake belongs to a kind of landslide-dammed lake which is closed related to Caoling landslide events.



Caoling Landslide lake Sediments

Mindulle typhoon attacked Taiwan on July 2nd, 2004, materials brought in from the upper watershed filled into the lake again, and finally caused the disappearance of New Caoling Lake.



3. Huge Cliff

This landscape is a broken sandstone sliding down into the Cingshuei Creek valley.



Once the New Caoling Lake was gone, the sedimentary bedform kept on lowering due to fluvial erosion. All of these dynamic changes had been marked on this landscape surface.

4. Miniature Landscapes



Frog Rock

This landscape is created by nature due to its well developed beddings and joints, and it earned its name from its frog-like shape.



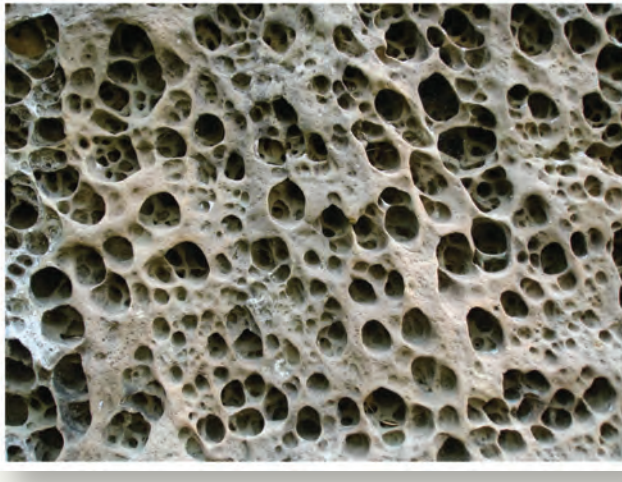
Stalactite landscape

Under the Frog Rock, there is a stalactite developed on a cliff surface because this Dawo sandstone contains plenty of fossils



Caverns landscape

Caoling's caverns landscape distributes on a cliff rock surface that lies right under the Frog Rock.



The diameter of these caverns diverse greatly, ranging from 1 mm to more than10 cm. These caverns present a beautiful structure that would be well appreciated when they are observed from a closer angle.



5. Shulien Cave Waterfall

This waterfall is a kind of "hanging valley" type waterfall. It is located at the intersection of tributary and main stream channel, with a height around 20 m.

The Chinese name for the cave at the base of the waterfall means water-curtained cave, and the name of this waterfall is in turn named as the cave. This cave had once emerged into the New Caoling Lake, and now it has submerged again.



6. Penglai Waterfall

This waterfall is located in the middle of Chugashui creek and is about 30 m high. It is probably caused by fault.



On the midway from Caoling to Ruili, visitors can appreciate this spectacular waterfall hanging on the steep mountain cliff.



7. Lianxinchu Waterfall

This waterfall is just located beneath the Lianxinchu pothole, with a height about 5 m. A 50 m shallow plunge pool is developed at the base of this waterfall.

Tongxin waterfall is located in the main channel of Neihu creek and is about 30m high. It is a typical kind of waterfall caused by the difference in rock hardness. This is the most spectacular waterfall in the Caosling Geopark.



8. Tongxin Waterfall

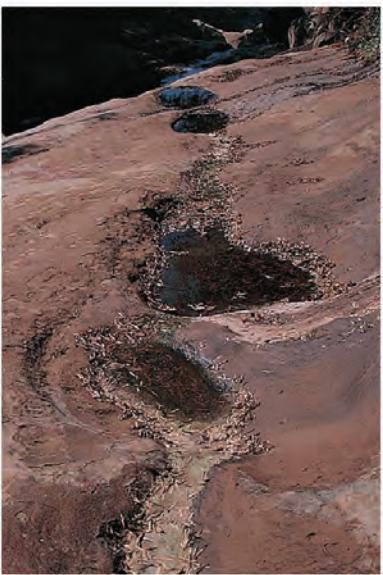


9. Jhanghu Fossil Layer

The Chunghu Fossil Layer is distributed on a declined river bed formed by the Dawo sandstone and the depth of this fossil layer is about 30 cm.

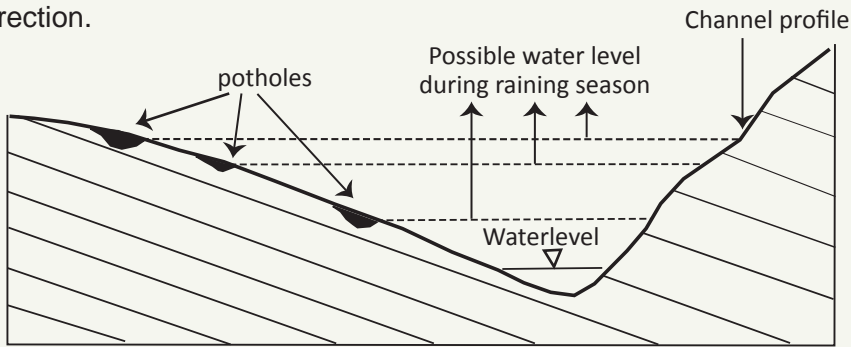


This fossil layer contains more than 70 species of fossil, of which the most abundant shell species is *Pecten* (海扇貝).



10.Shibi Pothole

Shihbi Valley is composed of a bare, declined Dawo sandstone, and the rivers within are developed along the strike direction.



Profile of spatial distribution pattern of potholes on Shihpi valley

Potholes in Shihbi Valley exhibit a spatial distribution pattern that is probably caused by various river levels throughout the wet season.



11. Lianxinchu Pothole

In the upper valley of shibi valley, about 1 km, there are also potholes with the same spatial distribution pattern which stretch out to a smaller area.



12. Lianzhuchi Pothole

This site has the largest area of potholes in the Caoling Geopark. The potholes in this landscape are mainly developed along the joints of strata and are connected by the running water.



13. Youqing Valley

Youqing valley is famous for the abundance of rapids and cascades developed along the meandering valley. Meanwhile, potholes and trace fossils were also formed on the river banks.

Dragon valley was developed along strike direction of Dawo Sandstone similar to the Shihbi Valley, on which several potholes were formed.



14. Dragon Valley



15. Ten Thousand Year Gorge

This is the most famous incised valley in Caoling. The valley is developed on Dawo sandstone along its strike directions similar to the Shibi Valley.



The incised valley here has a depth of more than 5 m. We can also see step-pool sequences and trace fossils in this site.