The ‘Sand Pyramids’ of Eastern Bosnia

Location; Dančići Village, 9km east of Foča
N 44° 37' 14" E 16° 50' 49"

The Bosnian ‘Sand Pyramids’ geological formation consists of pinnacles composed of soft muds that have been capped with more erosion resistant gravel beds.

This curious geological formation is located a few kilometres down a track off the Sarajevo–Miljevina–Foča highway. Not so much ‘pyramids’ as they are pinnacles, these conical towers are produced by the natural processes of erosion.

Due to different rates of erosion between the overlying gravel beds and the soft muds, the columns form with wide bases that narrow towards their tops.

The formation consists of what appear to be geologically recent sediments deposited within a fluvial environment, found resting at the surface above the dominating Mesozoic limestones of the region.

Alternating layers of soft mud and loosely consolidated gravel beds have been slowly eroded by the action of rainwater, frost and wind. The harder, more resistive gravel material caps the soft mud, protecting it from the elements and slowing its rate of erosion. The surrounding soft material without any capping gravel is eventually washed away, leaving the columns standing proud. Falling rainwater impacts the hard gravel at the tops of the pinnacles, leaving the soft underlying muds protected. The more exposed gravel will erode at a different rate to the muds below, producing columns with wide bases that narrow towards their tops.

Several pinnacles can be observed across the location, as well as a deep canyon on the opposing side of the formation. The pinnacles range in size from a few decimetres to over ten metres.

A deep canyon exists on one side of the 'Sand Pyramid' formation. The base of the canyon falls to at least 30 metres below the tops of the pinnacles.

As an interesting side note to come out of the observations made at this location is the fact that the formation is composed, in part, by a near-surface poorly consolidated gravel bed. This material, although different in clast size, shape, composition and thickness, is still somewhat similar to the near-surface poorly consolidated gravel bed found not so far away at the Ravne Tunnels within the Bosnian Valley of the Pyramids, Visoko. Both conglomerates at these locations are found at the surface, are barely lithified, and can be pulled apart by action of the hand alone. These observations speak of their geologically recent origins.

Conglomerates are the least common type of sedimentary rocks, representing only 2% of all sedimentary rocks exposed at the Earth's surface. Conglomerate rocks are also one of the least studied rock types by geologists, generally. Perhaps this is so because there is a bit of a 'conglomerate controversy' within the field of geology. Over the

years, a number of geologists have taken it upon themselves to study global occurrences of near-surface conglomerates and gravel beds.

Their observations have led some of them to believe that there is a temporal correlation between the deposition of these rocks and that their genesis is geologically recent. They suggest that for many of these young conglomerates to have been deposited at the same time, a global cataclysm must have occurred, such as a globally spanning flood. This hypothesis has led such geologists investigating the phenomena to be called ‘Creationist Geologists’ by their peers, which of course is meant as a derogatory, for no geologist worth his/her salt is claiming the world is only six thousand years old.

According to historic accounts, the ‘Sand Pyramids of Bosnia’ were only first mentioned during the Austro-Hungarian period and the formation has been estimated to have only started to form 200 years ago. This would suggest that indeed, the surrounding material which has since been stripped away by erosion, must have a been put in place in fairly geologically recent times.

The geomorphology of this curious geological formation is in constant flux. with erosion occurring every rainfall further modifying the shapes of the pinnacles.

Today, the processes of erosion are still ongoing and so the dynamic geomorphology of the Bosnian ‘Sand Pyramids’ is continually evolving, with some pinnacles slowly being degraded, to be eventually washed away completely, while others are starting to form or grow even larger.

The smallest ‘Sand Pyramid’ within the formation. The lowest bed of gravel is all that remains to protect the underlying soft muds. Once this final layer of gravel is washed away, this pinnacle will be no more.

Besides being a geological curiosity, the ‘Sand Pyramids’ formation is a fun place to explore, with the ability to walk right up to the pinnacles and the edge of the canyon (if you dare).

Despite being younger and on a smaller scale to similar geological formations found in Colorado, USA, or Cappadocia, Turkey, the Bosnian ‘Sand Pyramids’ are well worth a visit and further speak of the rich natural beauty found across the green countryside of Bosnia & Herzegovina.

- Richard Hoyle, Foundation Field Geologist
  (Visited Sand Pyramids of Bosnia September 2020)