

## Chapter 63

### What Caused Poljes?

A polje is a depression in a karst landscape. It is typically an elongated basin, valley, or plain with a flat floor and steep rock walls and is usually found in carbonate and gypsum terrains.<sup>1</sup> Karsts were defined in Chapter 54 under the subject of tower karst. Poljes have been confused with other karst features.<sup>2</sup> Some think a polje has to have a flat floor that is wider than 1,300 feet (400 m) to qualify for the term, but others think it needs to be enclosed and flat-bottomed, otherwise it is simply a depression in a carbonate terrain.<sup>3</sup>

Although a polje can be as small as 1 mi<sup>2</sup> (2.5 km<sup>2</sup>), they can sometimes cover large areas. One of the largest is in the Dinaric karst area, in Bosnia, northeast of the Adriatic Sea (Figure 63.1).<sup>4</sup> Another large polje is the Jiloca karst polje in northeastern Spain and covers 275 mi<sup>2</sup> (705 km<sup>2</sup>).<sup>5</sup>



Figure 63.1. Livanjsko Polje in the Dinaric karst is one of the largest in the world (Wikipedia).

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<sup>1</sup> Trenhaile, A.S., 1998. *Geomorphology: A Canadian Perspective*, Oxford University Press, Toronto, Canada, pp. 275-276.

<sup>2</sup> Ford, D.C. and P.W. Williams, 1989. *Karst Geomorphology and Hydrology*, Unwin Hyman, London, U.K.

<sup>3</sup> Silvestru, E., 1995. Can one define poljes? *Acta Carsologica* 24:503-507.

<sup>4</sup> Selby, M.J., 1985. *Earth's Changing Surface: An Introduction to Geomorphology*, Clarendon Press, Oxford, U.K., p. 311.

<sup>5</sup> Gracia, F.J., F. Gutiérrez, and M. Gutiérrez, 2003. The Jiloca karst polje-tectonic graben (Iberian Range, NE Spain). *Geomorphology* 52:215-231.

### **What Caused the Flat Depression Floor?**

Generally, a polje consists of limestone bedrock mantled by a thin veneer of alluvium.<sup>6</sup> However, some poljes can contain thick alluvium. The Duvanjsko Polje has 6,500 feet (2,000 m) of sediment.<sup>7</sup> Poljes often separate tower karst,<sup>8</sup> and are commonly aligned along tectonic faults or folds. They have been extensively studied in the classical karst landscape of Slovenia and the adjacent Dinaric Mountains of former Yugoslavia.

Some poljes are the result of downward faulting and infilling with sediments, including those in the Dinaric Mountains. So, poljes can be a combination of erosional and depositional processes.<sup>6</sup> But most poljes are carpeted by only a thin veneer of alluvium, forming an extremely flat topography.

### **Origin of Poljes a Puzzle**

The origin of poljes that often lie in rough weathering topography, such as carbonate terrains, is not well understood:

For several decades now karst poljes have been the object of geomorphological treatises, but we still do not know indisputably which factors have been decisive in the origin of a given karst polje. Some authors think all poljes are tectonic, others consider them as erosive, a third group as corrosive, and a fourth group maintains the opinion that the poljes are of combined origin; this compromise group has the most followers.<sup>9</sup> Corrosion is the erosion of rock through chemical processes as with the solution of limestone in a karst terrain. A recent article reinforces the difficulty uniformitarian scientists have explaining the origin of poljes:

Poljes are considered the most controversial karst landforms of temperate regions (Büdel, 1977). The process and factors which determine their origin and the development of stepped corrosion surfaces are two of the most debated aspects in this field.<sup>6</sup>

The earliest theories concluded poljes are the end product of depression enlargement from karst weathering, but this has been rejected. Selby wrote that they are somehow related to *planation along structural lines*:

A major feature of most poljes, and especially those of Yugoslavia, is that they are aligned along structural trends, especially along axes of folds, along faults or fault troughs, or along margins of contact with impermeable rocks. Some poljes may be tectonic features such as grabens [sic], but the majority are caused by laterally directed corrosion, or planation, and the geological influences merely guide erosion, not control it.<sup>10</sup>

### **Could Channelized Flood Erosion Form Poljes?**

Since planation processes were common late in the Flood, it is not too difficult to understand that channelized Floodwater could also carve flat surfaces in karst terrain, especially along the edges of folds, within grabens, or along faults. Flat surfaces are not forming today, reinforcing the view that poljes likely are a product of valley erosion that took place during the Channelized Phase of the Flood. The ongoing discovery of quartz and quartzite gravels associated with the

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<sup>6</sup> Gracia *et al.*, Ref. 5, p. 216.

<sup>7</sup> Silvestru, Ref. 3, p. 506.

<sup>8</sup> Ford and Williams, Ref. 2, pp. 428-432.

<sup>9</sup> Gams, I., 1969. Some morphological characteristics of the Dinaric karst. *The Geographical Journal* 135:568.

<sup>10</sup> Selby, Ref. 4, p. 311.

poljes in karst terrain<sup>11</sup> provides evidence of long distance water transport. This suggests erosion by Flood currents formed poljes rather than the present dissolving of limestone. The thick sediments in some poljes would have been transported into the area during the Flood and deposited in closed depressions creating a flat depositional surface. A Flood explanation is even more likely considering many researchers accept poljes as *relict* forms, meaning they are not being formed today but were carved in the past by an unknown process.<sup>12</sup>

Poljes are dated as middle to late Cenozoic, that is over 10 million years old within the uniformitarian timescale.<sup>13</sup> If this were true, the flat surface should be torn up by the dissolution of the limestone by now. Instead, the flat surfaces of poljes indicate *youth*.

In summary, poljes are yet another of the many landforms uniformitarian scientists find difficult to explain. Poljes can be explained as another result of the Channelized Phase of the Flood.

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<sup>11</sup> Gams, Ref. 9, p. 566.

<sup>12</sup> Gams, I., 1978. The polje: the problem of definition with special regard to the Dinaric karst. *Zeitschrift für Geomorphologie N. F.* 22(2):178.

<sup>13</sup> Selby, Ref. 4, p. 313.