NATURE TRAIL

the secret trails
of the Kanin
karst waters

VIRJE WATERFALL
AND THE SPRING OF GLIJUN

along the emerald trail

Bovec
Plužna

www.bovec.si

Virje waterfall at different water levels

THE TRAIL

The »Glijun and Virje – the secret trails of the Kanin karst waters« thematic nature trail enables visitors a chance to discover the complex and mysterious karst dephts world of the Kanin Mountain Range. In it, big quantities of water flow from waterfall to waterfall, from crack to crack and from stone to stone. Most of the water sources spring out on relatively few spots at the southern foot of the Kanin Mountain Range. In the cases of the Boka Waterfall and stream, the spring of Glijun or Nemčlja in the Možnica valley, the water sees the light of day in the form of a big waterfall or almost a river. Apart from that, also smaller springs or streams can be found in the area.

THE PATHS OF WATER DROPS

Heavy rainfall, water-rich rivers and snowy mountains

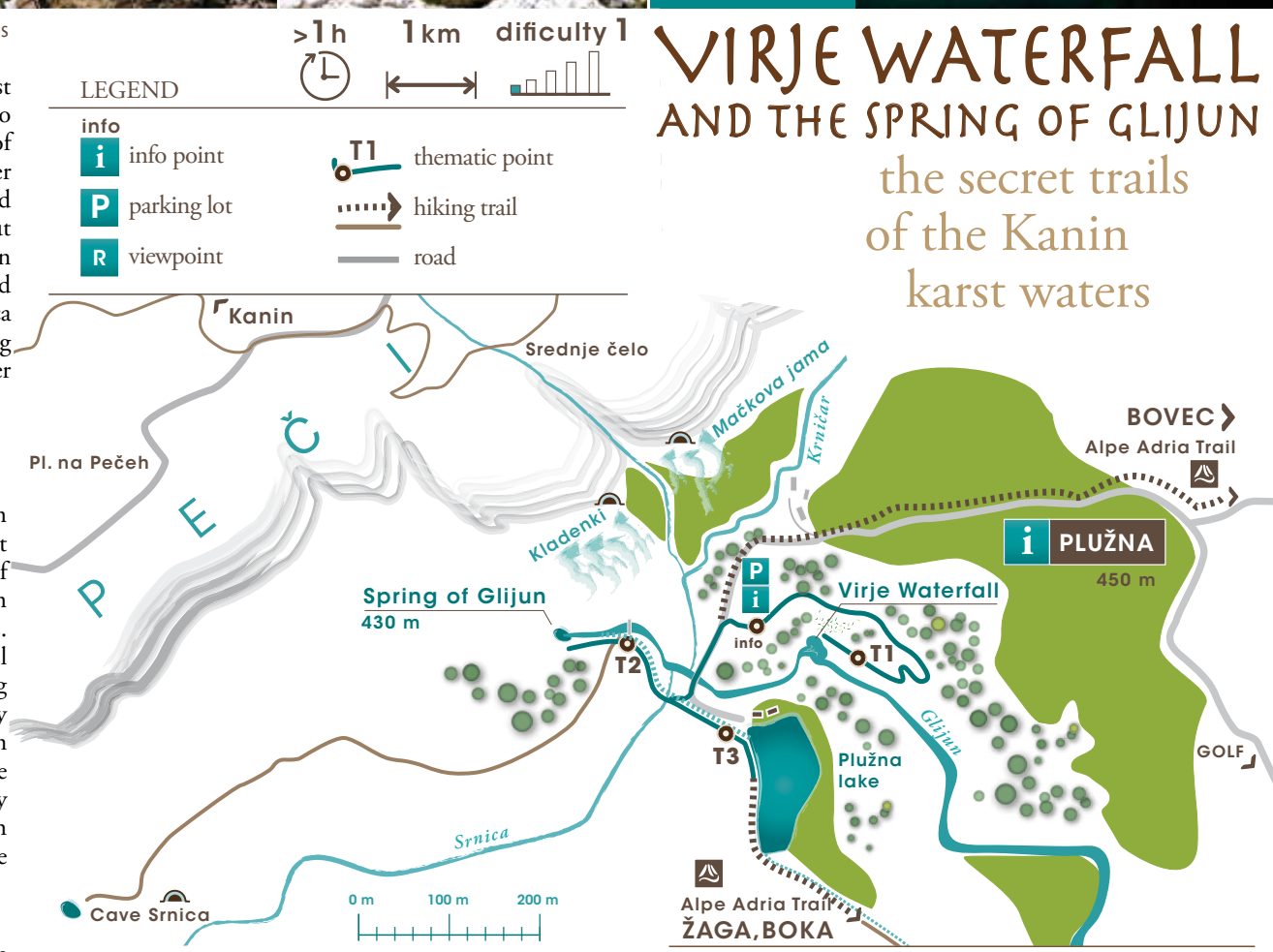
With an average yearly rainfall of 3500mm, the Kanin Mountain Range is considered to be one of the richest in Slovenia in terms of water. Sometimes, the amount of yearly rainfall even exceeds 4000mm. This is reflected in the high water levels of the rivers and Kanin karst springs. The waters are the highest in spring and autumn, which all fans of river sports are well aware of. Due to snow melting in the mountains, the high waters and good navigability are usually retained until mid-summer. Snow is the main reason for high water levels in the spring and summer. The winter snow cover on the Kanin Karst Plateau is usually more than five meters deep, in karst depressions it can reach a depth of more than ten meters. High water level in the autumn is usually associated with abundant autumn rains.

The mysterious paths of water drops

What happens to a drop of water when it falls on the bare karst surface of the Kanin Mountain Range? It first flows on a karst rinennkaren and slowly deepens it in doing so. Sometimes it starts to make its way further into the mountain by percolating through the limestone gravel. It can also fall on a snow cone and remain preserved in the karst depressions or kotliches until the snow starts to melt in the summer. Or it immediately slides to great depths on a karren. The ways in which it can reach the source are numerous!

The water in the karst underground

In the karst underground water gradually forms larger watercourses. Its paths run much like tree branches. Only cavers can discover them, but even for them this undertaking is usually hard, since running water in the form of subterranean lakes and siphons often blocks their way. Water containing free CO_2 has the capacity to dissolve limestone. A liter of water of the nearby spring of Glijun contains 95mg of $CaCO_3$. Rain- and meltwater also contain dissolved carbon dioxide. Vast quantities of water have so far dissolved so much rock on their way from the surface to the spring that the surface has lowered by several ten meters every billion years. This has caused the creation of large karst caves and typical eroded surfaces, or karst.



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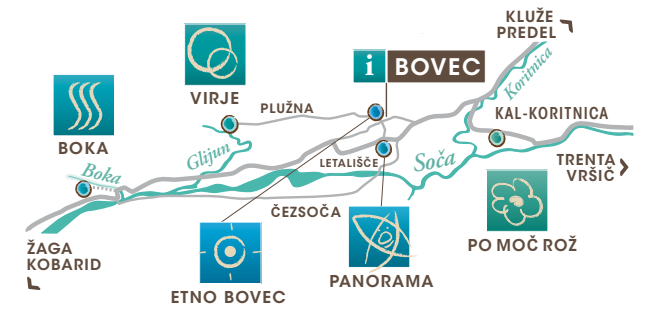

The pools below the waterfall carved in the rock have a depth of approximately 3.5m. The average water temperature is 8 °C.

other thematic nature trails around Bovec

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LAS RAZVOJ
Bogastvo podeželja ob Smaragdni poti

EVROPSKA UNIJA
EKSRP
LEADER
REPUBLIKA SLOVENIJA

Evropski kmetijski sklad za razvoj podeželja: Evropa investira v podeželje. Projekt sofinancira EU.

Glijun at different water levels
Below: the Plužna dam

THE KARST SPRING OF GLIJUN

The source of the stream of Glijun arises at an altitude of approximately 430m in a small valley head at the foot of the walls of Peči. The spring is filled up with glacial material and slope gravel, so the water must find its way out to the surface among many stones. Bedrock basis is not far below the surface, as it can be seen in the side stream bed of the occasional stream of Srnica, where the water has carved out a narrow gorge and erosion hollows.

Where do the waters of Glijun and Boka come from?
Glijun is one of the largest karst springs in the area and one of the few if not the only one that never runs dry. It very quickly responds to rainfall. Its drainage basin covers a large part of the central Kanin Mountain Range, particularly the Kanin Karst Plateau and the slopes below them. The western part of the mountain and the highest parts of the Kanin Karst Plateau feed the Boka waterfall. Due to the high position of the drainage basin the Boka arises around fourteen days later than Glijun in the spring time. The average discharge of Glijun is about 0.5m3/s, the lowest is about five times smaller. The average annual temperature of the spring water is about 6°C.

Characteristics of the spring water
Even in the coldest and most dry winter, more than hundred liters of water flow flows into the Glijun spring every second. Its average temperature is the highest at this time of year (+7°C), whereas the spring and summer water is about 2°C lower. The reason for this paradox lies in the fact that a thick layer of snow on the Kanin Karst Plateau begins to melt and the snowmelt causing the water of the spring to cool down. The snow can remain well into the summer, especially in karst depressions, kotliches and chasms. Boka runs dry completely in the winter, since its cold drainage basin in the high karst terrain is filled up with snow and does not let even a drop of water flow into the depths.

When the water gates open
Strong precipitation is a common phenomenon in the Bovec region. Autumnal rainfall can be as high as 300mm per 24 hours. When this occurs, many new water sources arise, jointly creating various sounds like a small water orchestra. Before the bridge above the gorge of Glijun and right before the Plužna accumulation lake, water rushing from all sides strengthens the flow of the Glijun and creates thundering sounds.

The orchestra of sources
Water also springs out from the cave of Srnica lying in the valley head at the end of the valley of Glijun. Srnica is one of the strongest occasional sources in the area. Its approximately 750m long tunnels on several floors are completely dry most of the year. With heavy rainfall, its tunnels are quickly flooded by water flowing to the lower and upper entrance. From the upper entrance a 35m high and very narrow waterfall occurs. This usually happens after several days of rain, only once a year and lasts only for a few hours. In the year of 1999 the water occurred several times. After such exceptional years, a year or two without this phenomenon can follow. With each period of heavy rain, water starts to flow down the slope of the waterfall and the nearby karstic torrent Krničar. The permanent source of Krničar appears in the lowest part of its bed, not far away from its confluence with Glijun.

The Plužna accumulation lake

Underwater canal of the Plužna accumulation lake

Map of the Kanin mountain range with the positions of some Kanin chasms and karst springs at the southern foot of the range (according to B. Komac, 2001). The map shows a significant difference in the number of karst springs on the southern and northern side of the Kanin mountain range.

Karst springs:
1. Tomažek
2. Gereš
3. Ubivnica
4. Glijun
5. Kladenki
6. Vodica
7. Žvika
8. Boka
9. Bočič
10. Spring at Bočič
11. Možnica
12. Goriuda

Shaft, cave

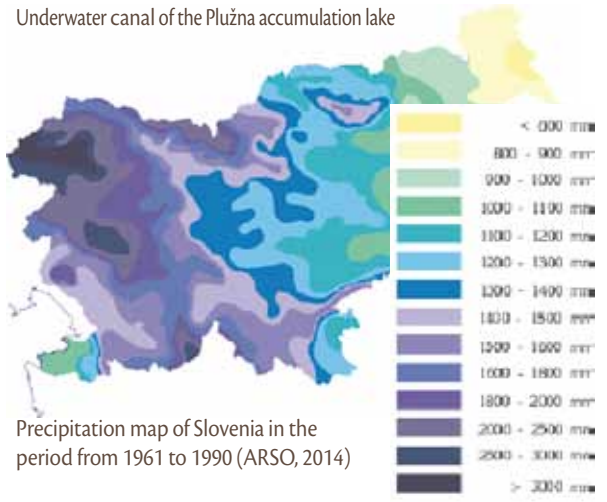
0 1 2 3 4 km

Cartography: Jerneja Fridl

THE SPRING OF GLIJUN
altitude: 430m
lowest discharge: 0,1 – 0,15m³/s
average discharge: 0,25 – 0,5m³/s
average water temperature: 6°C
water hardness - total: ~5°GH

EXPLOITATION OF GLIJUN WATER FOR THE HEPP PLUŽNA

HEPP Plužna was built between 1927 and 1931 during the Italian state administration of the Upper Soča Valley, when additional electricty was needed for the planned construction of a railway between the towns of Most na Soči and Tarvisio. Since the construction never took place, the HEPP Plužna later served the electrification needs of the Upper Soča Valley. The plant utilizes the energy of a strong and permanent karst spring of Glijun. Soon after the water comes out from the source, it flows into a 170m long channel to a water reservoir also known as the Plužna lake. From the lake, the water flows along a one kilometer canal until it reaches a steel pressure pipe and finally falls 66m into the so called Francis turbine. The water reservoir is filled or emptied according to the demands for electricity or in relation to the water supply. This can significantly lower its water level. The installed power of the HEPP Plužna is 1.720 MW with an annual production of 5,300 MWh.



Precipitation map of Slovenia in the period from 1961 to 1990 (ARSO, 2014)

Water canal of the HE Plužna

The limestone pavement on Skripi below the D station of the Kanin cableway (2100m) is covered with rinnenkarrren.