

### □ Geology

Retezat National Park is composed of the Retezat- Godeanu mountain ranges. The Retezat range extends north from the center, and rises from between the Petrosani and Hateg tectonic hollows.

The main characteristic of the Retezat Mountains is given by the presence of **two big eruptive blocks**

that stretch out in the direction of Lapusnicul Mare and Barbat rivers: the Retezat type granodioritic massif to the North, stretching out over a length of more than 40 km and width of around 20 km and the Buta granodioritic massif, located in the south of the Lapusnic- Barbat valley corridor, which drops under the Jurassic deposits of the Retezatul Mic.

A strip of crystalline schists with quartz schists, mica-schists and chlorite-amphibolic schists stretches between the two blocks.

**Another strip of crystalline schists**, adherent to the Danube domain, stretches out to the Northwest of the northern granite block. The crystalline mass fuses with the eruptive intrusions.

**The sediments** are represented by some Paleozoic and Mesozoic geological patches (especially Superior Jurassic and Inferior Cretaceous limestones), they are located on the eastern periphery of the Retezat (the Tulisa crest) and in the South- Southwest (Retezatul Mic).

The crystalline of the geitic layer can only be found on the northern face of the mountains, stretching further under the sediments of the Hateg and Petrosani hollows.

### Geomorphology

The Retezat National Park has a great diversity of forms, which makes the landscape peculiarly spectacular.

The relief is mainly shaped in accordance with the geologic structure and the characteristics of the lithologic substratum.

**A.** The main relief lines reflect the conformity with the structure, not only from the point of view of the direction, but also of the morphology.

The two granodioritic blocks generally correspond to the two **main crests**:

- In the North - **The Peleaga Crest** – consisting of Zlata (2142 m), Sesele Mari (2324m), Judele (2389m), Bucura (2432m), Peleaga (2509m), Papusa (2508m) and Baleia (1498m);

- In the South - **The Buta Crest**, over the corridor of the Lapusnicu Mare and Barbat rivers valleys, consisting of: Piatra Iorgovanului (2015m), Buta (1977m), Dragsanu (2076m) and Varfu Custurii (2453m).

- A real bridge, named Custura Papii, connects the two main crests; the three crests make up an “H letter”.

A series of **secondary heights** laterally originate from these two crests:

- Northwards, towards the Hateg border, the Retezat, Pietrele, Prislop etc. crests.
- Southwards, towards the Lapusnicul Mare Valley, the Slaveiul crest complex
- Southwestwards, the Piule (Retezatul Mic) orographic complex, having a transitional aspect between the Retezat and Godeanu mountains.

**B.** The characteristics of the *lithologic substratum* are a fundamental element in shaping up the Park relief characters.

- The Retezat, Buta and Muntele Mic granite massifs (real pivots, moulded through a long denudation), belonging to the Danube domain, **have the shape of elliptical bodies, sometimes stretching on tens of kilometers.**

- The granite rocks, extremely sensitive to the climate changes, show old alteration crusts looking like “**seas of rocks**”; the inter-rivers have the aspect of **toothed crests, towers and fangs,** at the feet of which are stunning steep slopes.

- The sedimentary rocks from the Tulisa and Retezat Mic massifs are mostly calcareous. Being soluble, these rocks generated an amazing landscape in terms of variety of the forms in the southern part of the Retezat National Park:

- **Valleys with narrow gorges sectors** (the Butii, Scocului, Scorotei gorges etc.),
- **Plateaus with *lapiezuri*** of different shapes and in all the evolution phases
- **Blind karst valleys** ( West Jiu, in the Dalmei cu Brazi sector),
- **Small dolines, and even a glacial basin, developed in dolomite limestone (the only one of this kind in Romania).**
- The endo - karst is well represented in the Park by the numerous **cavities** (around 200 caves and hollows) from the basins of Lapusnicul Mare, Soarbele, Jara, Scorota, on the left side of the West Jiu, upstream of Campu lui Neag.

- **The caves** are rich in stalactites and stalagmites (one can find here over 80% of the karst forms known) and they shelter a various cave fauna, of a real scientific interest.

On this petrographical platform, in the “world” of cliffs and saddles of the Retezat, the most representative climate modification generated relief forms are preserved, **the relics of the Quaternary glaciation in the Carpathians:**□

- **The glacial basins**, simple or joint, interlocked or suspended, with the over 58 permanent glacial lakes.
- **The glacial valleys**, on which the glaciers were gliding down to 1300 m, having lengths of 3 to 8 km and sometimes over 10 km (the Lapusnicul Mare Valley is the most representative).
- **The saddles** between the basins- the main saddle, stretching out from west to east, between the Zlata and Lazarului peaks, totalizes around 18 km.
- **The striated rocks** (ram backs),
- **The moraines – the most typical moraine in the Meridional Carpathians** is located on the Soarbele Valley.

The valleys have a big density (over 0,7 km / km<sup>2</sup>), creating a considerable horizontal fragmentation of the relief.

The heavy rains may cause landslides, due to the steep slopes. In August 1999, a uncommon rain determined major morphologic modifications on most of the valleys in the Retezat Massif. It is estimated that such phenomena of nature happen quite often (once in 50-100 years).

The relief energy and geodeclivity ( the value of the incline angle often reaches 60° ), the open fan like setting of the main crests, the position of the slopes, the limitrophe depressions and valley corridors are just some of the elements that give the beauty of the Retezat National Park.

*The most representative forms are located in the center of the Park.*□

## Hydrology

The tectonic, lithology and morphologic conditions of the Retezat Mountains, correlated with the positioning of the crests in relation with the advection of the oceanic air masses, make the massif be the area with the **highest humidity and draining in the Romanian Carpathians.**

**The abundant hydrographic network drains in two directions:**

- Northwards, towards the Strei River (the Mures hydrographic basin), which collects all the waters from the west, north and northeast of the massif.
- Southwards, towards the West Jiu river (the Jiul Romanesc Hydrographic basin).

The density of the river network is higher in the Strei hydrographic basin (0.8- 1.0 km/ km<sup>2</sup>) than in the one of the Jiu (0.7- 0.8 km / km<sup>2</sup>). According to the altitude, one can notice that the maximum density corresponds to the sub- alpine level and the minimum one to the alpine level.

The values of the specific medium drain increase proportionally to the altitude: from 14.3 l/s/ km<sup>2</sup> between 600 –800 m, at over 40 l/s/km<sup>2</sup> at altitudes higher than 2400 m. During the year, the maximum drain is usually reported in May- June, due to the snow melting and heavy rainfalls. The minimum drain takes place in the winter months, when the extremely low temperatures and precipitations do not offer the optimal conditions of maintaining the draining process. The winter drain conditions are stable and the summer drain is two times higher.

The average temperature of the rivers decreases proportionally with the altitude. It is around 4 °C at 1600 m and around 20°C at 2200m. The maximum temperatures of the rivers arise in July- August (12 to 22 °C) and the minimum ones in December- March (–20°C to 0°C).

The most important watercourse is Lapusnicul Mare, having an annual average flow of 12.9 m<sup>3</sup>/s. Waterfalls can be found on any brook within the Park.

**The relic natural lakes** play an important role in characterizing the hydrologic network of the Park. Their genesis was determined by the optimal conditions for the accumulation and transformation of the snow into glaciers, at altitudes higher than 1700 m, during the Superior Pleistocene. Over 37.8% of the Romanian glacial lakes are situated within the Retezat National Park. Located at the bottom of the glacial basins, ranged in tires, aligned, isolated or grouped in complexes, they represent a main attraction, not only for tourists, but also for the scientist who come to these places.

The morphometric elements of the lakes oscillate within large limits, some of them breaking the country records: Bucura- the largest glacial lakes, Zanoaga- the deepest. The surface of the lakes is between 300m<sup>2</sup> (Stanisoara I) and 88612m<sup>2</sup> (Bucura) and the maximum depth is between 0,3 m (Stanisoara I & II) and 29 m (Zanoaga). The volume of the lakes varies between 90.3 m<sup>3</sup> (Galesul II) and 693.152 m<sup>3</sup> (Zanoaga).

Although they have relatively small surfaces, the glacial lakes have a highly important role in the natural regularization of the draining of the rivers in the Retezat Mountains. 58 permanent glacial lakes exist in the entire massif, located between 1700 and 2300 m. Some bibliographical sources mention the existence of over 80 glacial lakes.

As a result of the 20th century anthropic interventions, the regularization of the river draining started to be controlled also by means of the **dam lakes (artificial lakes)**, which are built on Rau Mare. The building of the Gura Apei reservoir lake, at the junction of Lapusnicul Mare, Lapusnicul Mic and Ses rivers, started in 1975 and was finalized in 2000. Two subterraneous feed pipes, collecting the water from the Rausor and Nucsoara rivers were built for supplementing the water capacity of the dam. The hydro- technique buildings have generated, due to the absence of water on several hundreds of meters of the Raul Mare riverbed, upstream of the Tomeasa dam, ecologic modifications, which have been studied to a little extent, mainly on the Raul Mare Valley.

**The swamps** frequently appear in the Park in the surrounding area of some springs, alpine brooks or as the result of the partial clogging of some glacial lakes (the Judele glacial valley, the Negru pool, Lia, Bucura and Taul Rasucit lakes). These are the propitious areals to the water loving species.

**The shallow underground waters (phreatic waters)**, are mainly situated within the alteration crest at the bottom of the detritus areas (where important water reserves are located) and in the calcareous deposits area from the superior basin of the West Jiu river.

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### Soils

In relation with the altitude and rock structure, one can find in Retezat a great variety of soils, with acid soils in the crystalline part and alkaline soils in the calcareous area.

The forest and forest pastoral plannings identify 11 genetic soil types. The specific types of soil within the Retezat National Park are: brown acid soil and ferriiluvial brown, rendzina, brown eumezobasic soil, humicosilicatic soil, litho- soil, podsols and peat podsols, etc. The podsol is the most frequent genetic type, not only in the alpine area, but also in the forests. The brown acid soils and brown eumezobasic soils are more frequent in the forests.