

Interweaving Geological and Cultural Heritages in the Context of Limited Accessibility – an Example from Aragon

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ABSTRACT

The following paper highlights the importance of accessibility, with particular emphasis on public transport, as a factor enabling hiking in relatively large region with numerous sites of outstanding natural and cultural value. The region under consideration is a part Spanish Pyrenees. Namely massifs of Monte Perdido and Sierra de Guara both located in Aragon. The paper is predominantly based on personal experience and observations, which the author gained during his trip in September 2008.

Keywords: geological heritage, cultural heritage, accessibility, Pyrenees

INTRODUCTION

The route of the author has led through two different parts of Pyrenees. The first was the massif of Monte Perdido with its surroundings and the second was Sierra de Guara situated at the southern foothill of the first part. Both mountain groups are situated in the north of the Spanish region of Aragon. As a tourist destination this area apparently seems to be in a shadow of other more popular regions. On one hand Pyrenees as mountains seem to be less attractive than Alps and within Spain they seem to be less attractive than Mediterranean coast. However the author is sure that anybody who for any reason visits this area will not regret it. Rough mountainous nature with a variety of rocky forms is so impressive that it is really difficult not to pay any attention to geology regardless of the educational background of the tourist.

OUTLINE OF THE GEOLOGICAL STRUCTURE OF PYRENEES

The whole mountain range of Pyrenees is

usually divided into the following geological units.

Pyrenees axial (Fig. 1) – the oldest unit built mainly of Paleozoic sediments out of which granite batoliths stand out surrounded with metamorphic zones. Granite massifs form the highest parts of the mountain range along the Spanish-French border often exceeding the height of 3000 m asl. In Aragon Pyrenees these are Balaitous 3146 m asl.), Perdiguero (3222 m asl.), Posets (3369 m asl.) and the massif Aneto-Maladeta with the highest summit of Pyrenees Aneto 3403.5 m asl.). Their metamorphic zones form slightly lower mountains (Infiernos, Vallebierna, Sierra Negra) built of shale and marble. Sedimentary rocks are Silurian and Carboniferous slates (zone Carier, Castaneza); Devonian limestone of Pena Foratata and Carboniferous limestone from the zone of Canfranc as well as Permian-Triassic sandstones and conglomerates from Canal Roya and Aguas Tuertas.

Internal mountains – (in Spanish “Sierras Interiores”) is the unit adjacent to the previous one. This part of Pyrenees is built of Mesozoic and Paleocene sediments. These are predominantly limestone of

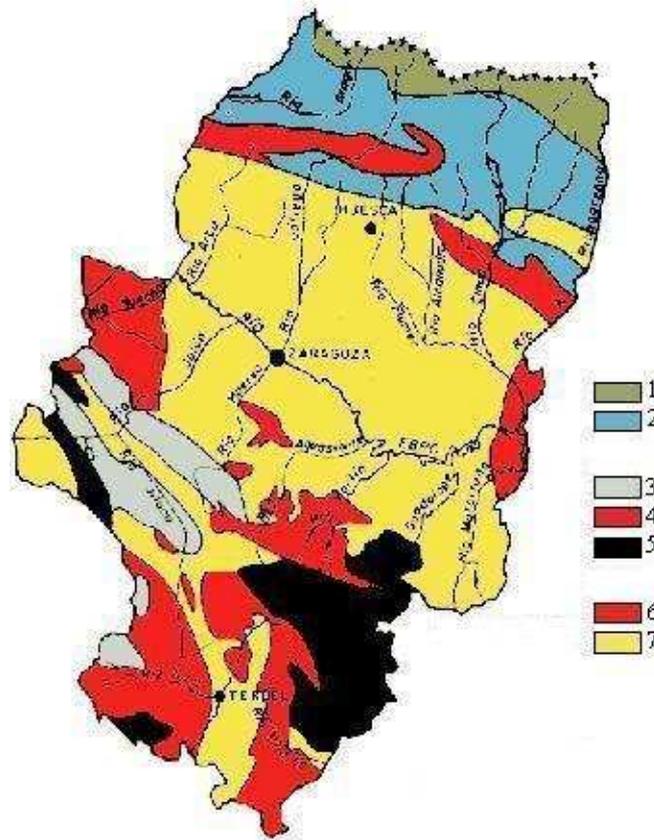


Fig. 1 Outline of the geological structure of Aragon, **Source:** [7], Pyrenees: 1 – Pyrenees axial Paleozoic; 2 - Pre-Pyrenees Meso-Cainozoic; Cordillera Iberica: 3 – Paleozoic; 4 – Trias and Jura 5- Cretaceous Basin of Ebro and Internal Depression: 6 – Oligocene; 7 – Miocene

different purity sometimes they are mixed with sandstones. The huge band of limestone extends from Alanos near the town Zuriza in the east through Petraforca, Bisaurin; to Aspe and Collarada-Pala de Ip-Punta Escarra (surroundings of Canfranc) and then through the Valley Tena-Otal it joins the huge nappe of Gabarnie-Monte Perdido and Cotiella so as to reach its western end in Jurassic limestone of Turbon.

Intra-Pyrenean Depression- (in Spanish “Depresion intrapirenaica”) this unit itself consists of three different subunits. Namely flysh, proper depression and synclinorium la Gurga. Pyrenean flysh similarly to flysh sediments known from other mountain ranges consists of Eocene deep see sedimentary rocks – alternate layers of sandstone, marl and clay. These sediments had been strongly folded during the alpine orogenesis. These rocks occur on the surface in outlines of mountain groups to

north from Canal de Berdun, Sierras de Biescas, Sobremonte, Sobrepuerto, Oturia, and Cotefablo as well as on the northern outline of the Aran Valley in La Fueba and in the Isabena Valley. The proper depression is filled in mainly with marls. On its southern fringe there is a stripe of conglomerates folded in the end of alpine orogenesis. They can be seen in the surroundings of San Juan de la Pena, Oroel and Cancias. Finally the synclinorium La Gurga is filled in predominantly with grey and grey-blue marls.

External mountains or Pre-Pyrenees (in Spanish “Sierras exteriores o Prepirineo”) – is the last and the southernmost unit, which has contact with sediments of Ebro Valley. It is built mainly of limestone. Tectonically external mountains are the last folds of the nappe, which slide from Gavarnie. The following mountain groups belong to this unit: Sierras de Santo Domingo, Loarre, La Pena, Gratal and Guara [6].

The route of the author (Fig. 2) starts at the Village of Torla in Pyrenees then it runs through the Valley Ordesa, southern slopes of Monte Perdido to Pineta Valley and the village of Bielsa. Next to the town Ainsa and then enters Sierra de Guara where it runs through villages of Arcusa and Lecina to the end in the village of Alquezar. So its northern part crosses Internal Mountains (*Sierras interiores*) whereas its southern part runs through External Mountains (*Sierras exteriores*). The diversity of rocks and landscapes is accompanied here with numerous monuments of human history, which date back to different époques from pre-history to relatively recent and painful memories of the Spanish civil war.

NATURAL AND CULTURAL ASSETS IN THE SURROUNDINGS OF MONTE PERDIDO

Torla can be reached by public transport with the only bus which arrives here from the town of Sabinanigo about the noon. The

village owns its beauty to the picturesque location on a small hill over the deep valley of Ara river surrounded with much higher mountains and to its architecture. A small densely built up village with all characteristics of traditional Pyrenean architecture (thick walls built of stones, elegant gates of houses, decorative chimneys). The tower of the parish church dated to XVIth century dominates the group of buildings. Torla had changed its function many times in its long history. Being a border fortress for centuries it became a smuggling centre in 40s and 50s years of XXth century but now it is purely tourist village.

Frequent bus service from Torla to Pradera de Ordesa makes the locality a real gate the National Park of Ordesa y Monte Perdido the oldest national park in Spain.

Ordesa Valley called sometimes a canyon constitutes the core part of the national park. Bus delivers tourist to the place called Pradera de Ordesa. Upstream one have to go by foot.

The elevation of valley's bottom spans



Fig. 2 Author's route, Source: [9]



Fig. 3 Ordesa Valley, **Photo by:** author

from slightly above 1400 m asl at Pradera de Ordesa to above 1600 m asl at Soaso whereas the elevation of upper edges of both slopes fairly exceeds 2200 m asl. So the very depth makes the valley very impressive. Glaciers shaped the valley in the “U” form during the quaternary glaciations and then it has been modeled by fluvial erosion. As a result one can see a canyon-like valley, which in some parts has more “U” shape and in other parts more “V” shape with two or three rocky steps on its slopes curved in cretaceous limestone (Fig. 3). Tectonically the area is very complicated and there is a number of recumbent folds cut with the valley in such a way that slopes of the valley make a false impression of little disturbed, almost horizontal layout of rock layers [6]. The Arazar river has a few waterfalls out of which the Cola del Caballo (a horsetail) seems to be the best known. The lower parts of the valley are forested. In the upper part near the place called Guidas de Soaso the forests reaches its upper border with rare single dwarf pines and gives place to

meadows, small bushes and large areas of naked rocks. To make the picture complete one should add that marmots are often seen on meadows or among stones as well as vultures on the sky.

The author did not reach the very peak of this mountain. However Monte Perdido with its elevation of 3355 m asl is certainly worthy to climb as the highest limestone peak of Europe. The mountain hut “Refugio de Góriz” enables climbing the peak within one day. However there is usually very short period in the year when the path is free from snow and ice. It is usually the first half of September. Access for tourists is possible from south-western side whereas the north eastern slope is covered with a glacier.

Anisclo Canyon is similar to Ordesa as regards geology but it is less famous and wilder. It is also particularly valuable as a habitat of some endemic plants. It is located to east from Ordesa valley. Two particularly exciting marked footpaths lead through its upper part. *Ruta de abajo* enables visiting the bottom of the canyon

whereas *Ruta de arriba* provides excellent view from slopes of Monte Perdido to mountain Pico Interior de Anisclo rising on the opposite side of the canyon with clearly visible fold structures on its slopes.

The glacial U-shape Pineta Valley is located to east from Monte Perdido. Its upper part is surrounded with magnificent summits of the main ridge of Pyrenees. It is drained by Cinca river which in its upper part is only a periodical watercourse. Special educational path provides the opportunity to learn about the geological history, relief and vegetation. Tourists can find a shelter for the night in the mountain hut *Valle del Pineta*. Asphalt road runs along the Valley to the nearest settlement Bielsa. However the valley is not served by any means of public transport.

Bielsa together with the neighbouring village of Javierre form a settlement picturesquely situated at the junction of two Pyrenean valleys Valle de Pineta and Valle de Bielsa. A few historic buildings are monuments of the long history of both villages. The Romanesque Church in Javierre dates back to XII century; the parish church in Bielsa was built in XVII century as well as the Town Hall of Bielsa whose renaissance facade is one of the most beautiful architectural monuments in the whole district. However the majority of buildings are relatively new. This is the result of tragic events of the Spanish civil war. Namely Bielsa with its surroundings formed so called "Bolsa de Bielsa" (The Sack of Bielsa) i.e. the area of long lasting resistance of republican forces against Franco forces. In the end of the fight a lot of inhabitants fled out to France through Pyrenees and settlements were heavily destroyed. The monument in the centre of Bielsa commemorates victims of the war. There is also an exhibition in the local museum dedicated to those events. Furthermore the local cemetery where the oldest existing graves bear dates from early 70s and relics of older graves date to 30s also reflects the gap in the development of the settlement.

Now, Bielsa is a tourist village with a number of shops, restaurants and accommodation facilities. It has the only bus connection with Ainsa - the centre of the district. It has operated every second day on weekdays. So only on Monday Wednesday and Friday morning one can leave Bielsa or arrive there by bus.

The historic centre of Ainsa is a jewel of medieval architecture. It is situated on a hill at the junction of Ara and Cinca rivers. The historic quarter constitutes well preserved complex of stone-built houses built closely one to another along narrow streets with several churches market square and walls of the castle. Its beginning dates back to early stage of Reconquest when Ainsa was a capital of the Kingdom of Sobrarbe, which later was incorporated into Aragon. It is really difficult to judge what is more interesting: the architecture on the hill or the view from the hill to Pyrenean summits.

Ainsa has relatively many bus connections with other towns and cities of Aragon and Bus station is combined with a bar and in the morning this is the only open building in the town.

SITES OF INTEREST BETWEEN TWO MOUNTAIN GROUPS

The area between High Pyrenees and Sierra de Guara apparently seems to be far less attractive than neighbouring mountains. However a closer look let the tourist realise that this first impression is false and that lower altitude is compensated here with a particular harmony between historic settlements and diversified relief. This refers not only to Ainsa but also to the whole area between this historic town and the village of Arcusa. To begin with the chapel of San Lino, which stands lonely among dry grey pastures A few kilometres further to the south the village Santa Maria de Buil and its hamlet San Martin picturesquely stick to slopes of a rocky hill. The church of Santa Maria was built in XVth century in Aragon gothic style

whereas the Romanesque church of San Martin dates to XIth century. Next, the picturesque village of Arcusa, with traditional Aragonian stone-built houses with characteristic decorative chimneys. Furthermore the area provides good opportunity to learn about scarcity of water in this dry area and ways of storing this precious resource. The modern water reservoir on Cinca River is visible to the east. Moreover a traditional roofed intake of water serving for watering cattle as well as a small irrigated vegetable garden can be seen at the entrance to Arcusa. The area is sparsely populated; some villages are not inhabited permanently. So, tourist cannot count here on public transport.

Down the Vero river

The famous Vero River as a permanent watercourse has its beginning in the big karst spring called in Spanish Fuente de Lecina (the spring of Lecina). However as a pre-Pyrenean river of Mediterranean regime it has a very irregular alimentation. So the upper part of the Vero basin is drained with periodical watercourses only. The dry stretch of this river has its beginning near the village El Pueyo de Morcat. Initially it runs southwards in a relatively narrow and deep valley. Then it turns to southeast and flows into a wide and plain part of the valley with villages Paules de Sarsa on left bank and Santa Maria de la Nuez on the right bank. The latter village is proud of its XVIth century sanctuary, which is now being renovated. Downstream the landscaped changes and the plain gives place to hills (Fig. 4) where the dry bed of the river meanders between slopes built of white marl covered with bushes.

Walking further one can reach the village of Lecina. Here starts the most attractive part of Vero Valley. One of the most breathtaking places is called "Abrigos de Barfaluy". This name encompasses a number of shallow caves situated to the south of the village at the merging point of two deep and narrow limestone canyons. The Canyon of Vero River and its right

tributary called La Choca. Rocky precipitous slopes of canyons are full of such caves, which in Spanish are called *Abrigos* or *Covachos*. [1] A few of them contain prehistoric paintings. They brought to this valley the fame similar to cave paintings known from Altamira as well as a few other regions of Spain i.e. Vizcaya, Asturia, Guadalajara and Málaga [3].

Prehistoric paintings in Vero valley represent different styles which developed in the area between 20 000 B.C and 1500 B.C. [5] Those in Barfaluy (Fig.5) represent the schematic style and date back to 5000 – 1500 B.C. Pictures are small but silhouettes of prehistoric inhabitants of the valley are still clear.

Near the village of Lecina the Vero River finds in its course a huge massif of limestone particularly resistant to erosion. Therefore this relatively small area is cut through the network of deep narrow canyons formed by the Vero River as well as its tributaries. The latter are only periodically drained and have in Spanish a separate name "Barrancos". Vertical rocky walls of canyons make the area particularly difficult to pass through, as there are few places where an ordinary hiker can cross the canyon. On the other hand the Vero canon is popular among fans of canyoning. They consider this canyon quite easy even for beginners in this sport. Narrow asphalt road dwindles on the left side of the valley with few opportunities to look down into the canyon. Similarly to other parts of the valley Lecina has no public transport connections.

Following tips of the hotel owner in Lecina the author managed to go by foot through this labyrinth of canyons. The path led first down to the spring of Lecina (Fuente de Lecina) a big karst spring, which gives the beginning to the Vero River as a permanent watercourse as well as it supplies tap water for Lecina. Then it ascended the left edge of the canyon with breathtaking view to the bottom of the canyon with the relics of the watermill. Then it led to the next cave with prehistoric

paintings. This time it was “Abrigo de Arpan” with the impressive picture of a stag. This picture represents Levantine style and was painted between 12000 and 5000 B.C. Further the route continued through the hill Pena Bolada hanging over the Vero

Canyon and the ravine “Barranco de Lumos” to the bottom of Vero canyon (Fig. 6) at the bridge of Villacantal. Here water of the stream lets tourists relax a bit before ascending the right side of the canyon and entering Alquezar.



Fig. 4 Dry part of Vero Valley, **Photo by:** author



Fig. 5 Prehistoric paintings in Abrigos de Barfaluy, **Photo by:** author



Fig. 6 Vero Canyon, **Photo by:** author

This village is situated on a rocky hill that rises over the Vero valley. Its name is of Arabic origin as there was a fortress guarding the northern border of Muslim state in early Middle Age. When captured by Christians during the reconquest it guarded southern border of Christian state. With the progress of the reconquest the border moved further to the south and Alquezar lost its military importance. So, the castle was converted into a monastery. Now the Collegiate Church of Santa Maria and the castle are the two most important monuments in this historic village. Main buildings of the church and the monastery date from the XIV century although some parts are much older e.g. the watchtower from XI century. The whole settlement is densely built-up with old small stone houses. Together with narrow streets it creates the historic character of the village. The lighting makes its night view particularly impressive. The rocky canyon of Vero ends a few kilometres to south from Alquezar and the river flows further. It debouches into plain of Ebro. Its floodplain is interesting from purely geological point of view [2] but it is far less attractive for tourists.

NATURE PROTECTION

Geopark is a form of protection of geological heritage and simultaneously geotourism is closely related to nature protection [4]. No wonder then, that the bulk of the above described objects administratively located in Sobrarbe district, is covered with a number of natural protected areas. Chronologically National Park Ordesa y Monte Perdido was the first of them established in 1918 and significantly extended in 1982. In 1977 UNESCO established Biosphere Reserve Ordesa-Viñamala, which covered a great deal of National Park with adjacent areas. Natural Park Sierra y Canones de Guara was established in 1990. Next natural park named Posets-Maladeta was established in 1994 (Fig. 7). It covers the area located to east from National Park Ordesa y Monte Perdido.

Moreover the Nature 2000 network overlaps these areas with 10 areas of Community Interest and 3 bird habitat areas. Furthermore the whole administrative district of Sobrarbe constitutes Sobrarbe Geopark, included in European Geopark Network since 2006. Exceptional



Fig. 7 Geopark Sobrarbe and other protected areas, Source: [8]

combination of prehistoric paintings and landscape of the canyon of Vero was main reason for establishing Cultural Park of Vero River in 2001. However UNESCO declared the very prehistoric paintings from the valley as World Heritage already in 1998.

POTENTIAL OF CONTINUITY VERSUS PUBLIC TRANSPORT CONSTRAINTS

The above described variety of protection forms indicates clearly that the whole area of Sobrarbe districts is highly attractive in

terms of geo-touristic, cultural and other attractions. It creates favorable conditions for long foot- or bike-trips, which lasts a few days. Numerous marked paths help to find the way across the region. Simultaneously, evenly distributed natural assets remain in contrast with uneven and fragmented provision of public transport services. The most frequent bus service is between Torla and Pradera de Ordesa in the Ordesa Valley. Here buses run every half an hour all day. The purpose of this arrangement is to protect the national park against the air pollution and noise caused by individual vehicles. However the very village of Torla is connected with the rest of

Aragon with the only bus that goes from Sabinanigo to Ainsa and back once a day. Any tourist, who crosses mountains between Ordesa Valley and Pineta Valley, cannot rely on similar service in the latter. Then the only bus runs from Bielsa to Ainsa only every second weekday. Ainsa has many bus connections with other cities of Aragon but villages between Ainsa and Alquezar are not served at all and again the village of Alquezar (touristic centre of Vero Valley) has the only connection with the district city of Barbastro only on schooldays.

CONCLUSIONS

The above described case of Sobrarbe geopark illustrates clearly that public transport should be seen not only as a measure reducing air pollution and noise caused by individual transport. Furthermore it is not only a substitute of private car in protected areas. In large areas of continuous attractiveness it is logical that some tourists choose multi-day foot trip as the best way to get to know the area. Therefore the provision of adequate public service

connections is necessary for them to start and to finish their trip, regardless of the possession of a private car. So, public transport should be regarded as necessary element enabling any geopark to perform its statutory functions.

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