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**A proposal for new conservation areas  
within the Lagorai mountain range**

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# 1. INTRODUCTION

## 1.1 Objectives

I decided to cover the topic “A proposal for new conservation areas within the Lagorai mountain range” for a number of reasons. First, because of my interest and passion for this mountain area in Trentino, which still presents features of low anthropization and remarkable ecological integrity, as well as great historical relevance. Secondly, to investigate more thoroughly the current state of the environment, the provision of ecosystem services, and the protection measures in force in the said area, both through Geographical Information Systems (GIS) technologies and interviews to experts and stakeholders.

The main goal of this research thesis is to study the geography and history of the Lagorai mountain range as well as the functioning of its ecosystems, and to identify a number of specific areas where a more refined form of environmental conservation could be envisaged. Such a measure could allow to protect part of the Lagorai from potential future overexploitation, without hindering the essential needs and traditional practices of sustainable use of the environment for those communities who have always populated the surrounding valleys.

As a matter of fact, particular attention is also paid in this research to the local ways in which forest areas, pastures, and other natural features are used. Most of the traditional practices of agriculture, forestry, livestock farming, and pastoralism are in fact rather sustainable and thus contribute to the preservation of the long-established balance between man and the environment within the Lagorai.

More specifically, this research thesis is organised in the following chapters:

- Chapter 1 - Introduction: this chapter introduces the main subject of the thesis, its internal structure and main objectives, the criteria used to define the framework of the research work, and the state of the art;
- Chapter 2 - Geo-historical context: this chapter illustrates the geological and geographical context of the Lagorai, as well as the history of human habitation

and colonisation of the mountain range, from prehistoric times up to the present day. In this chapter special attention is also paid to the way people have colonised the mountains in the past and to the signs left by humans on the environment at different times in history;

- Chapter 3 - The nature and environment of the Lagorai: this chapter describes the main characteristics of the natural environment of the Lagorai. Starting from the different climates present within the mountain chain, it then goes on to expose: the species of flora prevailing at different altitudes (vegetational belts); the main features of the humid environments and peat bogs; the fauna, from the large mammals to the avifauna, arthropods and ichthyofauna;
- Chapter 4 – Past and present conservation plans for the Lagorai mountain range: this chapter provides an account of the environmental protection measures implemented in the past and of those currently in force in the Lagorai territory. It also presents the proposals for the environmental protection that have been propounded in the last decades by associations and activists, as well as the various attempts to overexploit the Lagorai territory over the years;
- Chapter 5 – Methodology: this chapter describes the survey methods adopted for conducting the interviews and implementing the GIS project of this thesis. A special focus is placed on the techniques that were used to collect both qualitative and quantitative data from the interviewees, to identify the target areas, and to frame these areas within a GIS analysis of land cover and of the potential provision of ecosystem services;
- Chapter 6 – Results: this chapter displays the results of the thesis, i.e. the opinions of the interviewees, who are all knowledgeable about the Lagorai; the digital cartographic representations of the areas identified by the respondents and also those selected for the GIS analysis; the results of the GIS analysis of the potential capacity of such areas to provide ecosystem services;
- Chapter 7 – Discussion: This chapter discusses the results, i.e. the combined findings of the interviews and GIS analysis, and then illustrates where it would

be most necessary and advisable to implement new environmental conservation measures;

- Chapter 8 – Conclusions: This final chapter summarises the results of the research, interviews and GIS analyses, with a reflection on the practical utility of the outcomes in relation to both the current state of the Lagorai and the possible future prospects for its environment;
- Chapter 8 – Appendix: The appendix contains a brief reference to the interviews conducted for the thesis.

Here are the fundamental research questions of this research work, in the order in which they are answered throughout various sections of the thesis and especially in the Chapters RESULTS and DISCUSSION:

- What are the main environmental, geological, cultural, and historical features that make the Lagorai - Rava - Cima d'Asta mountain range so unique and worthy of being preserved and/or promoted?
- Which proposals have already been submitted in the past for the enhancement and protection of the natural environment of the Lagorai, and for what reasons were they often rejected? Moreover, are the conservation measures that are currently in place within the Lagorai adequate for its conservation, also considering the industrial and building projects that have jeopardised the environmental integrity of the Lagorai in the past?
- Which ecosystem services are most important for the various areas identified by the interviewees within the Lagorai territory? To what extent are they actually provided?
- Considering the data gathered from the archive research, the scientific articles and journalistic reports, the interviews and the GIS analyses, which areas of the Lagorai are particularly worthy of environmental and cultural protection, and on what grounds?

## 1.2 State of the art

The peculiar characteristics of the Lagorai Mountain Range have attracted the interest of many scholars and given rise to numerous research works in recent decades. From the point of view of naturalistic studies, however, until the first half of the 20<sup>th</sup> Century the Lagorai was never given much attention. As a matter of fact, early scholars of natural studies, and with them of course also travellers and mountaineers, focused more willingly on the majestic Dolomites, which aroused great admiration due to their unusual shapes and steep rock walls.

The Lagorai mountain range, on the other hand, was for a long time considered only in functional terms. In the years leading up to the outbreak of World War I, for example, this area was extensively studied and mapped by Italian and especially Austro-Hungarian cartographers, but this was done almost exclusively for military purposes.

The Austro-Hungarian generals, in fact, had chosen the Lagorai mountain range as part of the front on which to establish trenches and fortifications in the event of an attack launched from the south. While the use of the Lagorai as a frontline during the First World War profoundly devastated the region, it also encouraged a much more comprehensive mapping and spatial study of the area.

In fact, up to that time all territorial surveys in the region had been very approximate. Carried out in the previous centuries on behalf of local lords, ecclesiastical authorities, or by royal mandate, they provided inaccurate information on a vast and almost totally wild territory, which would have otherwise escaped even more the control of the secular and religious organs of power. Few traces remain today of these early investigations, which were probably not even the result of field research, and the few documents on the Lagorai preserved to this day are mostly of cartographic nature.

For example, we remember here the regional map *Die Firstlich Graffschaft Tirol*, which translates literally to “The princely county of Tyrol”. This cartographic representation was created by Mathias Burgklechner between 1608 and 1609, when Archduke Maximilian ‘der Deütschmeister’ commissioned him to produce a comprehensive map of his county in Tyrol. The Lagorai mountain range is not clearly outlined in the

depiction, but some of its most representative rivers and hamlets are already mentioned.

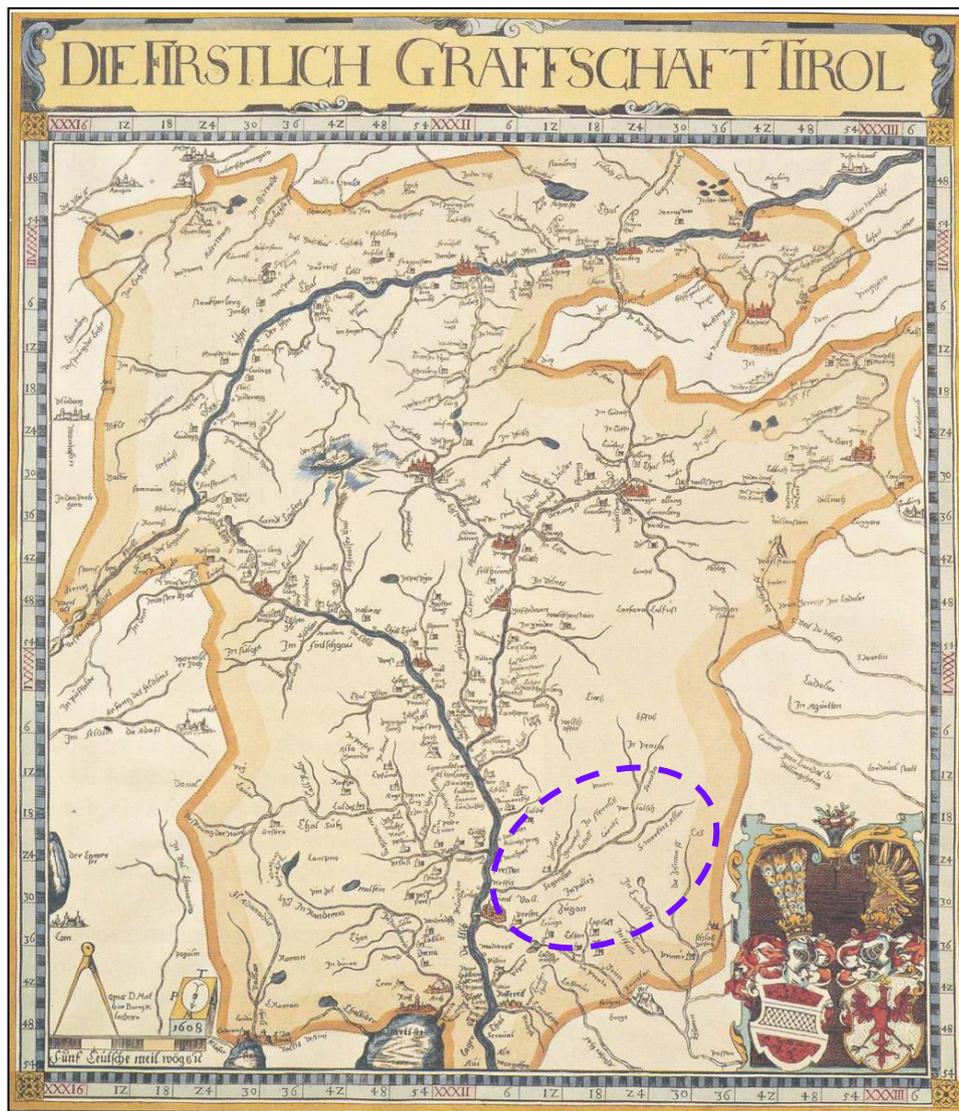


Figure 1: The cartographic representation *Die Fürstlich Graffschaft Tirol* (1608-1609) by Mathias Burgklechner. The blue circle highlights the area roughly corresponding to the Lagorai mountain range.<sup>1</sup>

In a rendering inspired by the same map, but dating back to a later edition of 1678, some mountainous reliefs are also depicted, and a number of relevant villages on the slopes of the Lagorai are mentioned: to the south-west, Palù del Fèrsina (*In Pallej*), Pergine (*Persen*), Levico (*Levigo*), Borgo Valsugana (*Burgen*), Grigno (*Grim*), the river Brenta (*die Prenta*) and the Tesino plateau (*...in Thesin*); to the east, Primiero (*Primör*) and the Canali stream (*Die Sismon. fl.*); to the north, the Cembra (*Zimbers*) and

<sup>1</sup> Image adapted by Enrico Carraro from Beimrohr, 2008.

Fiemme (*In Fleimbs*) valleys with Segonzano (*Segonsán*), Cavalese (*Cávales*) and Predazzo (*Partatsch*).

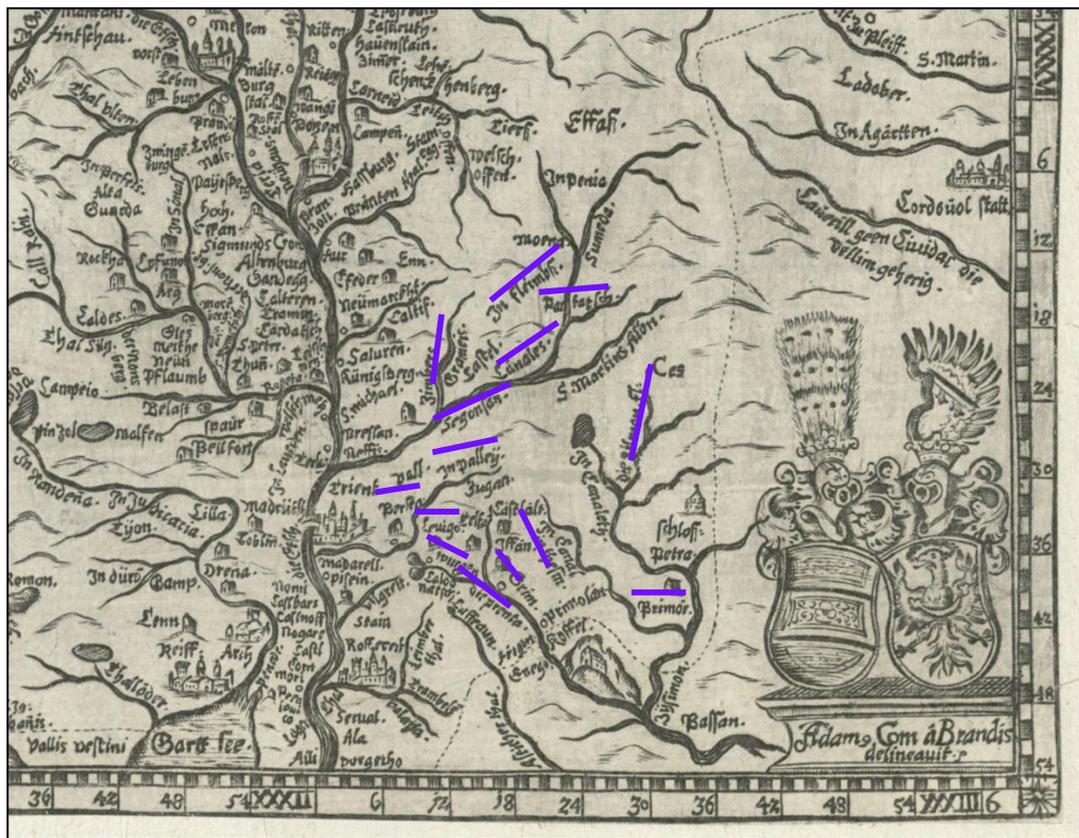


Figure 2: A section of the 1678 edition of the map *Die Firstlich Graffschaft Tyrol* (1678) by historiographer Franz Adam von Brandis. The aforementioned names of towns, villages and rivers have been highlighted in the image.<sup>2</sup>

It is in another seventeenth-century map, however, that we can finally see the Lagorai depicted for what it really is, namely, an entirely mountainous wilderness area with stylized reliefs, extensive forests, and numerous rivers. We are referring here to the *Territorium Tridentinum* map by Johannes Janssonius, which dates back to 1633 and depicts the majority of the territory surrounding Trento. In addition to the topographic names of various localities, this cartographic representation also showcases for the first time the name of a specific mountain (*M. Zelan*). This could be a sign that in the first half of the 17th century there was already a certain degree of awareness of the orography of the Lagorai. The toponym *Zelan* reoccurs in other maps from roughly the same period, and it is most likely a reference to Cima Ziolera, a peak that was already quite renowned at the time because it was located near the Manghen Pass and thus

<sup>2</sup> Image adapted by Enrico Carraro from [www.mapy.mzk.cz](http://www.mapy.mzk.cz)

along the main timber trading route that led from the Fiemme Valley to the Valsugana Valley and the Venice Republic (de Battaglia, 1989).

In addition, two lakes can be seen on the map, and these are yet another typical feature of the Lagorai mountain range. One of them, although presented without a name on the map, can easily be recognised as Lake Erdemolo, from which the Fèrsina stream originates and then flows down the Mòcheni Valley. The second lake, on the other hand, is located in the mountains behind Borgo Valsugana and is referred to as *Lake S. Martino*. This is a no longer existing lake “always present in the old Trentino cartography [...], located in the upper Larganza Valley northwest of Roncegno, and whose tradition is still alive among local populations”<sup>3</sup> (Tomasi, 1963).

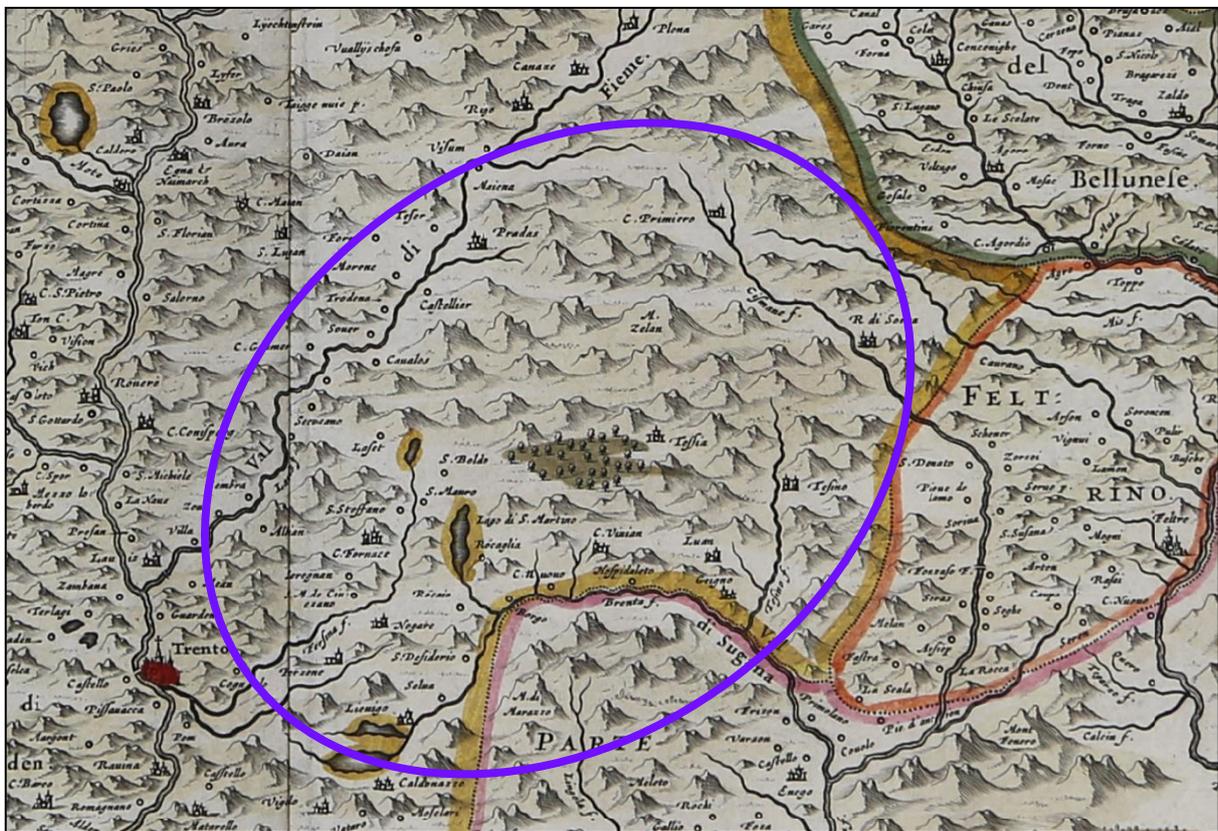


Figure 3: The map *Territorium Tridentinum* (1633) by Johannes Janssonius. The Lagorai area, with many of its mountain peaks and its wild forests, is circled in blue.<sup>4</sup>

<sup>3</sup> [Original quotation] “sempre presente nella vecchia cartografia trentina [...], che si trovava nell’alta Val Larganza a nord-ovest di Roncegno, e la cui tradizione è ancor viva nelle popolazioni del posto” (Tomasi, 1963).

<sup>4</sup> Image adapted by Enrico Carraro from [www.antiquarius.it](http://www.antiquarius.it)

Depictions of the Lagorai such as those shown so far demonstrate not only the lack of geo-political interest in an area that in the past was only sparsely inhabited and very little cultivated, but also the fact that until a few centuries ago, the Lagorai retained a high degree of environmental integrity. This should not lead us to believe, however, that human groups did not travel through this area or exploit some of its resources. In fact, as we will elaborate later, the first stable frequentations of the Lagorai for hunting purposes date back as far as the Palaeolithic and Mesolithic period. Nevertheless, we need to specify that until just before the First World War, very few of the anthropic activities conducted in the Lagorai were so significant as to alter its landscape appearance and natural characteristics in any substantial way.

In addition to the ones shown so far, there are numerous other cartographic representations of the following decades and centuries in which the Lagorai is represented more or less distinctly and in varying degrees of detail. In this context, it would not make much sense to consider them all.

However, there is one map that deserves a special mention: the *Atlas Tyrolensis* (1774) by Peter Anich and Blasius Hüber. This is actually the first cartographic representation of the Tyrol region that is based on proper geodetic research, i.e. a process of geographical investigation that aims to determine the exact and permanent position of places by considering the curvature of the earth's surface and other parameters such as the shape and size of our planet.

With regard to the Lagorai, the *Atlas Tyrolensis* is definitely significant as it is the first map, according to our research, on which various peaks and valleys of the Lagorai appear with their correct names and precise spatial location. The map also shows some of the lakes of the mountain range (Lago di Quarazza, Lago di Cima d'Asta), together with the main streams, creeks, high altitude pastures and even water sources.

Although the authors of the map overlooked some important details, such as the Lagorai Lake, which does not appear in the representation despite being the largest body of water in the entire mountain range, the precision with which the map is drawn compared to maps of previous periods shows that in the second half of the 18th century there was already a fair degree of knowledge of the Lagorai territory.



Figure 4: The section of the *Atlas Tyrolensis* by Peter Anich and Blasius Hüber depicting the territory of the Lagorai mountain range.<sup>5</sup>

In addition, the toponym *Lagorai* appears at one point on the map. This is a significant detail, as it indicates that during the 18<sup>th</sup> century the area was already commonly identified with this name. The position of this toponym on the map seems to confirm what various topographical studies have also showed, i.e. that the name *Lagorai* was used since the Middle Ages to specifically indicate the mountains “from the Cadino Valley to Colbricon, from the Manghen Pass to the Rolle [Pass]”<sup>6</sup> (de Battaglia, 1989). Only later, however, has its meaning been extended to include the entire Lagorai chain, as we intend it today.

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<sup>5</sup> Map retrieved from [https://upload.wikimedia.org/wikipedia/commons/2/2f/Atlas\\_Tyrolensis-small.jpg](https://upload.wikimedia.org/wikipedia/commons/2/2f/Atlas_Tyrolensis-small.jpg).

<sup>6</sup> [Original quotation] “dalla Val Cadino al Colbricon, dal Passo del Manghen al Rolle” (de Battaglia, 1989).



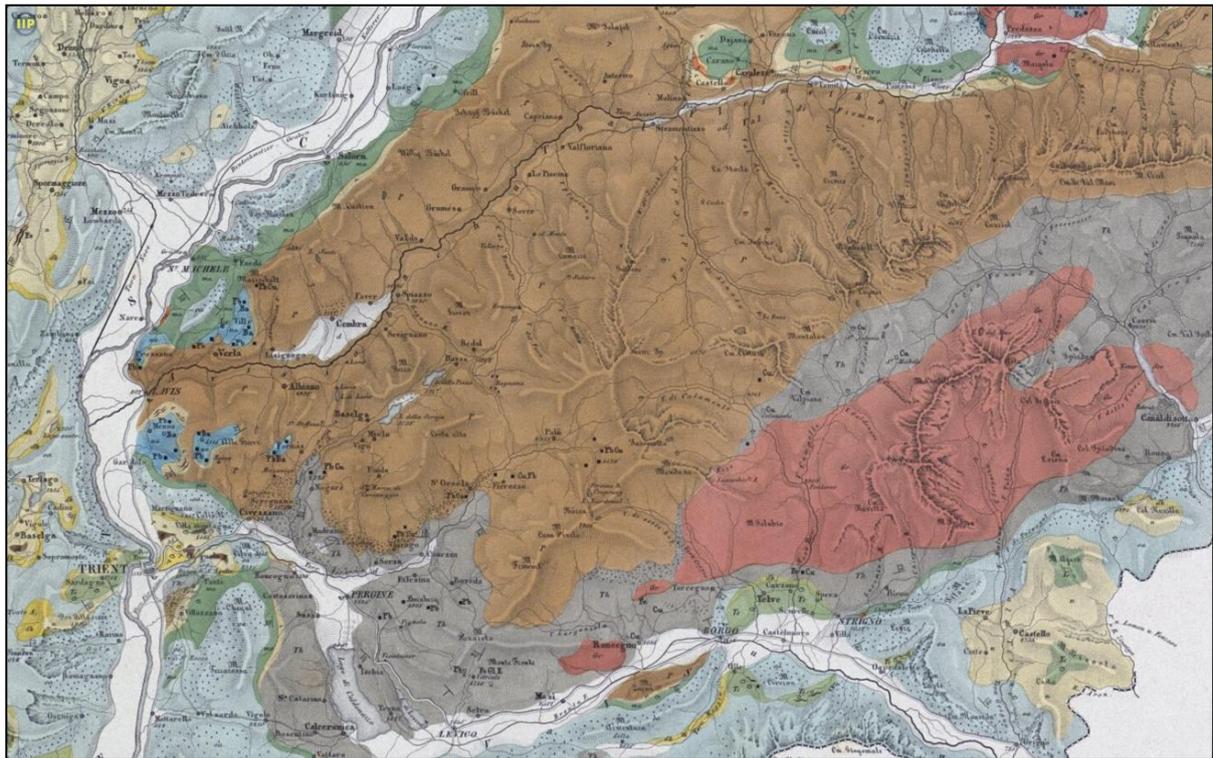


Figure 6: The section of the geognostic map *Geognostische Karte Tirols* (1849) by Sebastian Minsinger depicting the Lagorai porphyritic flow (in orange) and the granite outcrops of the Cima d'Asta and Rava groups (in red).<sup>9</sup>

For the purpose of this thesis, however, it would not make sense to dwell further on the historical cartography related to the Lagorai, which despite being interesting and diverse does not provide any further useful insights beyond those already highlighted. As we have seen so far, what is important to deduce from the maps is in fact that for many centuries the Lagorai was not overexploited and therefore remained remarkably intact with regard to its landscapes, ecosystems, and habitats.

Wanting to focus instead on the written production referred to this mountain range, we realize that there are very few past written works specifically devoted to its territory. There were probably numerous direct or indirect references to the Lagorai in the normative texts of the various local power bodies and parishes that aspired to control the valleys and communities surrounding the mountain range. However, to search for individual mentions of this kind would be a challenging and potentially superfluous task for this research thesis.

<sup>9</sup> Map retrieved from Vorarlberger Landesbibliothek - <https://pid.volare.vorarlberg.at/o:2741>.

Therefore, by limiting the analysis to works dedicated in their entirety (or for a relevant part) to the Lagorai, we first find an early writing dating back to the mid-nineteenth century. We are referring here to the chapter 'Die Lagorai-Kette und das Cima d'Asta-Gebirge' written in 1860 by Gerhard vom Rath and published in 1863 in the journal *Jahrbuch der Geologischen Bundesanstalt*.

At the beginning of the chapter, the author refers to another German geologist and geographer who was his contemporary, Ferdinand Freiherr von Richthofen. Referring to him, vom Rath points out that "With an activity that deserves admiration, he has explored this country, which in the richness of geognostic phenomena probably no other in Europe equals, and compiles in his work his own studies together with those of earlier researchers. He did not visit the 'mighty keystone' of the area of his map - the Lagorai chain and the Cima d'Asta mountains, and informs that hardly anything has become known about this promising region since Buch's news - except for the map published by the Geognostic-Montanistic Association"<sup>10</sup> (vom Rath, 1863).

The even earlier research to which the author refers is probably the studies of Christian Leopold von Buch (1774-1853), a German geologist and geographer who made numerous geological investigations in Europe, and also in Italy. He briefly described the physical geography and geology of the Lagorai in his work *Geognostische Beobachtungen auf Reisen durch Deutschland und Italien*, which was first published in 1802.

Furthermore, the fact that vom Rath says of von Richthofen that he had not been able to visit the Lagorai in person, and that very little had been written and documented about it until his own publication, indicates once again that until a couple of centuries ago the Lagorai mountain range was not known in detail from a scientific point view, as was often the case for many other mountainous areas in Italy and Europe more in general.

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<sup>10</sup> [Original quotation] "Mit einer Thätigkeit, welche Bewunderung verdient, hat er dies Land, dem an Reichthum der geognostischen Erscheinungen wohl kein anderes in Europa gleichkommt, durchforscht, und stellt in seinem Werke die eigenen nebst den Studien früherer Forscher zusammen. Den „mächtigen Schlussstein des Gebietes seiner Karte, die Lagorai-Kette und das Cima d'Asta-Gebirge, hat er nicht mehr besucht und theilt mit, dass über jene viel versprechende Gegend seit den Nachrichten von Buch's kaum Etwas bekannt geworden — die vom geognostisch-montanistischen Verein herausgegebene Karte ausgenommen" (vom Rath, 1863).

In addition, the document shows that von Richthofen had referred to the Lagorai as “Den mächtigen Schlussstein” (which translates to “the mighty keystone”) of the much larger alpine area he had examined. This indicates that even at the time, scholars knew that the Lagorai was not just an ordinary mountain range, but rather an area worthy of high consideration both for its peculiar geological conformation and for the natural environments that characterised it.

Vom Rath's paper then goes on to present an extensive and accurate description of the geological and morphological aspects of the Lagorai, analysed valley by valley and peak by peak, “from Cavalese in Fleims [Fiemme] to Borgo in Val Sugana”<sup>11</sup> (vom Rath, 1863).

What interests us the most is that in this commendable exposition, many of the environmental aspects of the Lagorai are also precisely described. For example, the author says “The Val Cadino, which flows into the Avisio valley a little below Cavalese, rises slowly, with wide gentle slopes. Impenetrable fir forest, which, like the Cadin Valley, covers the entire northern plateau-like slope of the Lagorai chain, obstructs any further view. [...] When the limit of tree growth is reached, the bare, dark peaks appear, and the pass itself”<sup>12</sup> (vom Rath, 1863).

The following pages of vom Rath's paper focus on the geological features of the region, while also providing an extremely precise indication of the areas, mountaintops, meadows, and valleys of the mountain range, including the tributary ones. Although the names of geographical features are not always matching the present-day ones, they do, however, reveal a moderately precise comprehension of the spatial configuration of the Lagorai.

Also relevant are some of the depictions presented by the author of the article to better explain the stratification of rocks in the Lagorai mountain range. In fact, they portray the landscapes of some important peaks: Cima d'Asta, Cima Ceremana, Cima Cece,

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<sup>11</sup> [Original quotation] “Von Cavalese in Fleims nach Borgo in Val Sugana” (vom Rath, 1863).

<sup>12</sup> [Original quotation] “Die Val Cadin, welche etwas unterhalb Cavalese in's Avisio-Thal mündet, hebt sich langsam empor, mit weiten sanften Gehängen. Undurchdringlicher Tannenwald, welcher wie die Val Cadin, so den ganzen nördlichen plateau-ähnlichen Abfall der Lagorai-Kette deckt, hindert jede weitere Aussicht. [...] Ist die Grenze des Baumwuchses erreicht, so erscheinen die nackten, dunklen Gipfel, auch der Pass selbst” (vom Rath, 1863).

Cima Valmaggioro, once again Cima Cece - from another perspective - , and finally Cima Tognola.

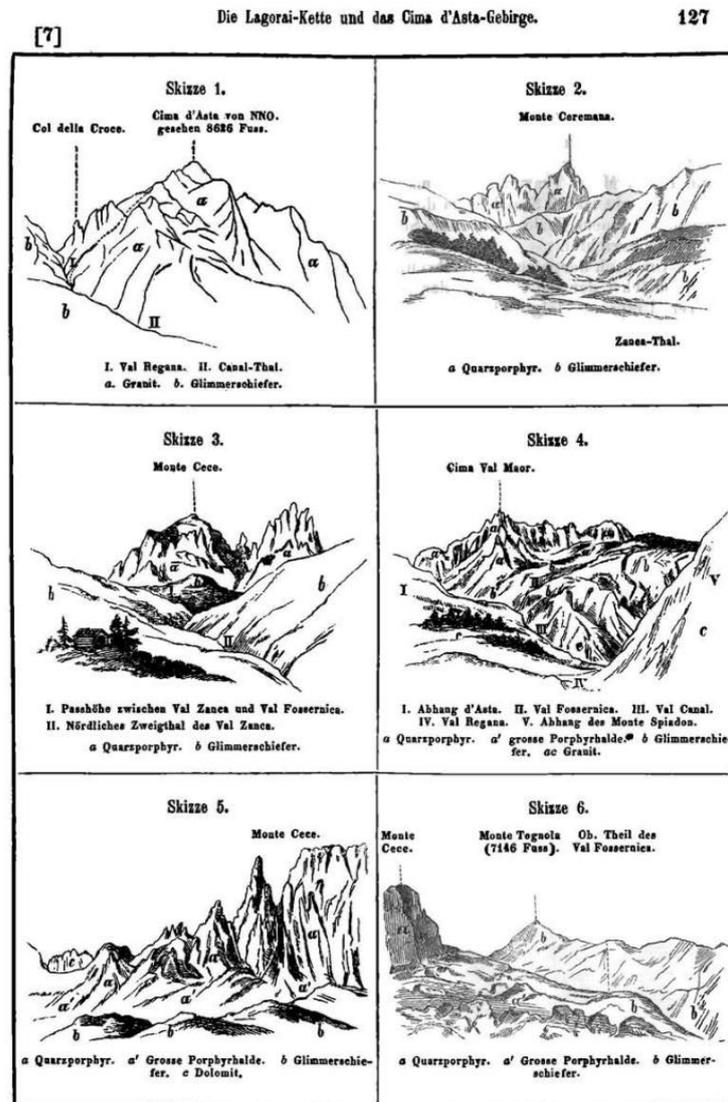


Figure 7: Some of vom Rath's depictions showing the geological stratifications in some of the peaks of the Lagorai mountain range.<sup>13</sup>

At the beginning of the 20th century, Giovanni Battista Trener published in the journal *Verhandlungen der Geologischen Bundesanstalt* two more writings containing his geological considerations and titled respectively 'Vorlage der geologischen Karte des Lagorai und Cima d'Asta-Gebirges'<sup>14</sup> (1902) and 'Über die Gliederung der

<sup>13</sup> Image from vom Rath, 1863.

<sup>14</sup> [Translated title] "Presentation of the geological map of the Lagorai and Cima d'Asta mountains".

Quarzporphyrtafel im Lagoraigebirge'<sup>15</sup> (1904). The first of these two articles is significant for us, as it describes the Lagorai as an “almost virgin area”<sup>16</sup> (Trener, 1902).

In the following decades, the number of works partially or entirely devoted to the Lagorai finally increased. These came on top of the extensive and accurate wartime cartographic production made necessary by the settling of the frontline between the Italian and Austro-Hungarian forces along the mountainous ridges of the Lagorai.

In particular, it was in the early decades of the 20th century that the first naturalistic studies were carried out in the area.

Let us first of all recall the numerous publications that appeared from 1928 onwards in the journal *Studi trentini di scienze naturali: rivista della Società per gli studi trentini*. There is no need to mention specific articles here; suffice it to say that some of the publications in the journal contained detailed scientific references to the Lagorai.

In 1929, Ciro Andreatta, a young and talented geologist from Trentino, published the extensive study *Ricerche petrografiche sulla regione di Cima d'Asta*<sup>17</sup>. As can be deduced from the title of the publication, in his analysis the author focused exclusively on the geological characteristics of Cima d'Asta, and not on the environmental aspects of the area. Nevertheless, his research work should be mentioned here as it constitutes a much more extensive, meticulous, and precise investigation than the previous ones.

In 1935, Dr. Enrico Poda, director of the chemical section of the Laboratory of Hygiene and Prophylaxis in Trento, published a study with the title *Composizione chimica e proprietà fisico-chimiche dell'acqua dei laghi alpini di Lagorai*<sup>18</sup>; this was probably the first research work to focus on the high-altitude lakes of the Lagorai, one of the main geomorphological peculiarities of the mountain range we are examining in this thesis.

In the same year, Dr. Giuseppe Morandini published the paper ‘Studi limnologici invernali al Lago di Lagorai’<sup>19</sup> on the monthly magazine of the Club Alpino Italiano -

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<sup>15</sup> [Translated title] “On the structure of the quartz porphyritic table in the Lagorai mountains”.

<sup>16</sup> [Original quotation] “dieses fast jungfräuliche Gebiet” (Trener, 1902).

<sup>17</sup> [Translated title] “Petrographic research on the Cima d'Asta region”.

<sup>18</sup> [Translated title] “Chemical composition and physical-chemical properties of the water in the Lagorai alpine lakes”.

<sup>19</sup> [Translated title] “Winter limnological studies at Lake Lagorai”.

CAI (Italian Alpine Club). The study focuses on the chemical, physical and biological characteristics of the water of Lake Lagorai during winter. As already mentioned, this lake represents the largest body of fresh water in the entire mountain range.

In 1949, Morandini then supplemented his previous studies with his new work 'Ricerche limnologiche sugli alti laghi alpini della Venezia Tridentina : (secondo contributo) : Sella, Lagorai, Val delle Pozze'<sup>20</sup>, which he had extended to other mountainous areas, such as the Sella group and the Valle delle Pozze.

Then in 1935, the limnologist and biologist Edgardo Baldi published his research 'I planctonti del Lagorai'<sup>21</sup>. This was once again a study focused on the waters of the Lagorai, but with a particular focus on aquatic fauna, specifically plankton.

In 1937, Gerhard Lampadius published another very meaningful study with the title *Die Höhengrenzen der Cima d'Asta und des Lagorai-Gebirges*<sup>22</sup>. This was a survey of the different elevation zones in the Lagorai, which examines the variations in the tree line, the periodic settlement boundaries, the cultivated land boundaries, the various settlements and their history, together with the geography of the region and the variations in the local flora depending on different altitudes.

Without specifically mentioning their works, we would like to at least recall some other authors who further contributed in the following decades to the study of the geology, morphology, and nature of the Lagorai territory: Paolo Antolini, Peter Giese, Claudio D'Amico, Giovanni Segatta, Alberto Freddo, and several others.

Given the increase in the volume of written production relating to the Lagorai during the rest of the 20th century, and given that we are gradually approaching the present day, we will refer for the remainder of this chapter on the state of the art almost exclusively to those works that are almost entirely pertaining to the study of the environment of the Lagorai mountain range, and therefore also to the conservation and protection of the local flora and fauna, natural and cultural heritage, and landscapes.

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<sup>20</sup> [Translated title] "Limnological research on the high-altitude alpine lakes of the Venezia Tridentina : (second contribution) : Sella, Lagorai, Val delle Pozze".

<sup>21</sup> [Translated title] "The plankton species of the Lagorai".

<sup>22</sup> [Translated title] "The elevation limits in Cima d'Asta and between the Lagorai mountains".

In 1959, the Tridentine author Aldo Gorfer wrote an extensive and much-appreciated geographical encyclopaedia of the whole of Trentino, titled *Le Valli del Trentino*<sup>23</sup>. His work was initially published in a single volume, and was later expanded and divided into two sections: *Trentino Occidentale* (focused on Trento and the valleys on the west side of the Adige river) and *Trentino Orientale* (focused on Rovereto and the valleys on the east side of the Adige river). This book, which according to the author himself constitutes a "geographical, historical, artistic and environmental guide"<sup>24</sup>, analyses in detail the history, heritage, customs, and natural environments of the entire Trentino region. The exposition is organised by administrative municipality. The volume on eastern Trentino also includes a very detailed description of the Lagorai territory and its history. This guide by Aldo Gorfer is therefore to be considered a very important work, also in light of the local fame enjoyed by the author as an expert connoisseur of the history, traditions, and different natural and human environments of Trentino.

Another major and fundamental work dedicated to the geography of the region is the book *I laghi del Trentino*<sup>25</sup> by Gino Tomasi. Dating back to 1963, this encyclopaedia of the region's freshwater basins is a unicum: in fact, it constitutes a systematic exposition of all the lakes in Trentino, enriched by historical reconstructions on the role that the various lakes have played for local populations from prehistoric times to the present day, and also on the legends related to them. This work also includes accurate descriptions of the hundred or so lakes which are present in the Lagorai, even though some of them (the minor ones) are sometimes presented in pairs.

The work *I laghi del Trentino* is certainly fundamental for the study of the Lagorai and its precious territorial integrity, especially when we consider that the author Gino Tomasi, besides being a great naturalist and a prominent figure for the museums of Trentino, was also one of the main creators of the Adamello Brenta and Paneveggio-Pale di San Martino natural parks, as well as an ardent promoter of a natural park in the Lagorai. For these and other reasons, *I laghi del Trentino* together with many other writings and publications by Gino Tomasi appear extremely significant for the purpose of this research thesis.

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<sup>23</sup> [Translated title] "The Valleys of Trentino".

<sup>24</sup> [Original quotation] "Guida geografico-storico-artistico-ambientale".

<sup>25</sup> [Translated title] "The Lakes of Trentino".

As evidence of both the lifelong commitment of Gino Tomasi to the preservation of the natural heritage of Trentino, and the timeless significance of his contribution to the study of the region, it is appropriate to mention that in 2004 his book on the lakes of Trentino was thoroughly updated and re-published, this time with a new title: *I trecento laghi del Trentino*<sup>26</sup>.

At this point it is worth mentioning the work *L'ambiente naturale e umano dei parchi del Trentino*<sup>27</sup> (1973), commissioned by the Autonomous Province of Trento and based on various studies coordinated by the *Museo Tridentino di Scienze Naturali* (Tridentine Museum of Natural Sciences). Once again, it was Dr. Gino Tomasi who contributed both as a coordinator and editor for this remarkable work. However, numerous other illustrious scholars were involved in this publication.

The book *L'ambiente naturale e umano dei parchi del Trentino* considers the Adamello-Brenta and Paneveggio-Pale di S. Martino natural parks, analysing in great detail their geology, lakes, running waters, glaciers, avalanches, climate, fauna, plant ecology and phytogeography, high-altitude flora, infrastructures, landscape, and also the first human settlements.

This work, although being fifty years old, is significant for this thesis because it describes the Paneveggio-Pale di S. Martino Park in detail. As we shall see later, a small section of the northern Lagorai chain, near Passo Rolle and the Colbricon lakes, also falls within the perimeter of this natural park. Although tiny in size, this area of the Lagorai is extremely significant from a historical and archaeological point of view.

The commitment and dedication of Gino Tomasi to the effort for the environmental protection of the Lagorai mountain range also emerges from his many other publications, studies, newspaper articles, and speeches on the topic at various local and national conferences. Let us recall, for example, his speech "Lagorai: identità di un parco e sua proponibilità"<sup>28</sup>, which he delivered in Vetriolo Terme on 21 June 1986 during the conference *Lagorai: ecologia, forestazione, turismo, occupazione, identità*

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<sup>26</sup> [Translated title] "The three hundred lakes of Trentino".

<sup>27</sup> [Translated title] "The natural and human environment of the parks in Trentino".

<sup>28</sup> [Translated title] "Lagorai: the identity of a park and its feasibility".

*di un parco*<sup>29</sup>. The whole conference provided important insights and new perspectives on the sustainable use of the Lagorai mountain range's territory and on possible new forms of ecotourism. However, we will have the opportunity to analyse these contributions more in detail in the chapter of this thesis dedicated to the past efforts (which unfortunately were mostly to no avail) to establish a natural park in the Lagorai, Rava and Cima d'Asta mountain groups.

Another author, in turn, is to be credited with producing the first monographic work entirely dedicated to the Lagorai. We are referring to the book *Lagorai* (1989) by the journalist, essayist, and writer Franco de Battaglia. His work is a masterpiece that stands as a true point of reference for those who want to know more not only about the geography, but also the history and traditions of the Lagorai mountain range. This monograph is proposed as “a journey through time and space within one of the most vast and exciting landscapes of the Alpine chain”<sup>30</sup>, in “an area of unconstrained and pristine nature: the Lagorai and Cima d'Asta”<sup>31</sup> (de Battaglia, 1989). This work also includes a small insert, edited by Tiziano Borsato and titled *Atlante dei Laghi di Lagorai e Cima d'Asta*<sup>32</sup>. It features a selection of photographs of the numerous waterbodies (over 95) and lacustrine environments (over 330) located within the mountain chain and which are the hallmarks of the Lagorai.

Here are also some other more recent contributions to the study of the natural and cultural heritage of the Lagorai:

- The book *Spedizione subacquea al Lago Brutto (m. 2207) nel Gruppo del Lagorai*<sup>33</sup> (1989), by Roberto Maino;
- The book *La Catena del Lagorai: contributo alla conoscenza della fauna*<sup>34</sup> (1990), by M. Caldonazzi, B. Maiolini, P. Pedrini, S. Zanghellini, L. Betti;

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<sup>29</sup> [Translated title] “Lagorai: ecology, forestation, tourism, employment, identity of a park”.

<sup>30</sup> [Original quotation] “un viaggio nel tempo e nello spazio dentro un paesaggio fra i più vasti ed emozionanti della catena alpina” (de Battaglia, 1989).

<sup>31</sup> [Original quotation] “un comprensorio di natura libera e integra: Lagorai e Cima d'Asta” (de Battaglia, 1989).

<sup>32</sup> [Translated title] “Atlas of the Lakes of the Lagorai and Cima d'Asta”.

<sup>33</sup> [Translated title] “Diving expedition to Lago Brutto (m. 2207) in the Lagorai Group”.

<sup>34</sup> [Translated title] “The Lagorai chain: a contribution to the understanding of its fauna”.

- The concise and straightforward pamphlet *Malghe del Lagorai. Proposta per un utilizzo ragionato di un patrimonio economico, culturale e ambientale*<sup>35</sup> (1990), published by the WWF Sections of the Bassa Valsugana e Tesino and of the Fiemme and Fassa Valleys. This booklet constitutes a brief account of the conditions of the Lagorai pastures at the beginning of the 1990s. It also suggests ways in which this unique heritage could be restored in the future, by focusing on a sustainable kind of development that considers both the environment and the local traditions;
- The study 'Sulla presenza di Calanoidi in alcuni laghi alpini del Lagorai nel Trentino occidentale (Crustacea: Copepoda)'<sup>36</sup> (1990), by Bruno Maiolini;
- The book *Ultime cime. I segni dell'uomo e del tempo nel massiccio del monte Croce (Lagorai)*<sup>37</sup> (2003), by Mario Corradini;
- The book-report *Perché il silenzio non ha parole: malghesi e pastori del Lagorai*<sup>38</sup> (2003), by Daniele Lira. This is a reflection on the historical, economic, and cultural significance of the malghe (the traditional herders' mountain huts) and of transhumant sheep farming in the south-eastern Lagorai;
- The publication 'Il destino delle malghe: trasformazioni nello spazio alpino e scenari futuribili di un sistema di consuetudini d'alpeggio'<sup>39</sup> (2004), published in the journal *Annali di San Michele* by the former Museo degli Usi e costumi della gente trentina - MUCGT<sup>40</sup>, which has now become the METS - Museo etnografico trentino San Michele<sup>41</sup>. This is a very fascinating study, which offers insights and important reflections on the rational and sustainable use of alpine pastures and huts at the present time;

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<sup>35</sup> [Translated title] "Malghe of the Lagorai. A proposal for a thoughtful use of an economic, cultural, and environmental asset".

<sup>36</sup> [Translated title] "On the presence of Calanoids in some alpine lakes of the Lagorai in western Trentino (Crustacea: Copepoda)".

<sup>37</sup> [Translated title] "The last peaks. The signs of man and time in the Monte Croce massif (Lagorai)".

<sup>38</sup> [Translated title] "Because silence needs no words: herders and shepherds of the Lagorai".

<sup>39</sup> [Translated title] "The future of alpine huts (malghe): transformations in the alpine space and future scenarios for an alpine pasture customs system".

<sup>40</sup> [Translated] "Museum of Traditions and Customs of the people of Trentino – MUCGT".

<sup>41</sup> [Translated] "METS - San Michele Ethnographic Museum of Trentino".

- The research study ‘Biodiversità degli Ortotteri del Lagorai’<sup>42</sup> (2006), by Barbara Agabiti, Cristina Salvadori and Ruggero Valentinotti;
- The book *Fauna del Lagorai: foto e video dal fondovalle alle cime del Lagorai*<sup>43</sup> (2008), by Adriano Agnoli, Faustino Piazzzi and Silvano De Marco;
- The book *Sui sentieri del Lagorài : viaggio alla scoperta di Natura 2000 : dodici itinerari per osservare, conoscere e capire la montagna*<sup>44</sup> (2009), edited by the Commissione Tutela Ambiente Montano - SAT<sup>45</sup>. Although it constitutes a guide for mountain trails, this document is still very important as it makes the reader aware of the importance of the European Natura 2000 network of conservation areas;
- The in-depth study "Uno studio integrato dei laghi di Colbricon e Cavallazza"<sup>46</sup> (2018), by Renata Trevisan, which analyses in detail the important site of the Laghetti di Colbricon, even going so far as to reconstruct the prehistoric vegetation thanks to a study of sediment samples from the bottom of the lakes.

Another source that is worth mentioning, although it is a website, is the online database *Trentino XP – Laghi del Trentino* ([www.trentinoxp.it](http://www.trentinoxp.it)). This site is proposed as “the largest database of Trentino lake itineraries”<sup>47</sup> and is managed by two hikers and mountain enthusiasts, Claudio Moratelli and Katj Coser. This catalogue, although amateurish, is extremely valuable as it presents the recorded data of no less than 325 out of 341 basins in the Trentino region. For each of them it provides detailed information on the geographical coordinates, orientation, origin, geological nature, depth, and extension in width and length of the lake. Furthermore, it also offers a small bathymetric map, a representation on graphical and satellite maps, and a series of on-site photographs, taken both in winter and summer. Finally, there is usually a rather extensive description of the general characteristics of each lake and the best route to

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<sup>42</sup> [Translated title, as published by the author] “Biodiversity of Orthoptera from Lagorai”.

<sup>43</sup> [Translated title] “Lagorai fauna: photos and videos from the valley bottom to the summits of the Lagorai”.

<sup>44</sup> [Translated title] “Out on the trails of the Lagorài : a journey to discover Natura 2000 : twelve itineraries to observe, know and understand the mountains”.

<sup>45</sup> [Translated] “Commission for the Protection of the Mountain Environment – SAT”.

<sup>46</sup> [Translated title] “An integrated study of the Colbricon and Cavallazza lakes”.

<sup>47</sup> [Original quotation] “La più grande raccolta di itinerari dei laghi del Trentino”.

reach it. Of course, the Trentino XP database also includes the over one hundred lakes and ponds that give the Lagorai chain its name. For this very reason, this website can be considered a useful source for this research thesis.

Lastly, let us recall some other recent publications, research, and studies devoted entirely to the idea of a regional or national natural park in the Lagorai.

First of all, we should mention the magazine *Lagorai: perché un parco*<sup>48</sup> (1993) published by the WWF as a supplement to the magazine *Panda* n°5 (May 1993) and edited by the WWF Delegation of Trentino (Sections of Bassa Valsugana and Tesino, and of the Fiemme and Fassa Valleys). This publication is crucial to our thesis, because it is one of the official presentations of the first formal, structured, and complete proposal for a natural park in the Lagorai-Rava-Cima d'Asta mountains. As we shall see more specifically in the chapter dedicated to the past efforts of environmental activism, unfortunately the park could not be established due to the blind opposition of some politicians of the Magnifica Comunità di Fiemme, driven by collective, personal, and political interests. However, the broad involvement of experts and the maps used by the WWF to propose the park still mark a fundamental milestone in the conservation effort to preserve the Lagorai. Furthermore, it is worth noting that the proposal was complemented by a series of conventions, debates, studies, and newspapers articles, all of which were related to the Lagorai, its environment, and the possible establishment of a natural park.

Another work which is worth mentioning here is the *Sondaggio di opinione sull'idea di parco nel Lagorai-Rava-Cima d'Asta* (1991), dating from two years before the WWF's official park proposal (but subsequent to its first draft). This opinion poll was carried out by the SAT Sections of Borgo Valsugana - Tesino and was conducted mainly in Valsugana, thus involving some of the southern municipalities that are part of the Lagorai territory. Its aim was to understand whether or not there were the right prerequisites among the population for the establishment of a natural park in the Lagorai.

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<sup>48</sup> [Translated title] "Lagorai: why a natural park?".

With a similar purpose in mind, a multi-day discussion round table was organised almost twenty years later by Europe direct Trentino, the Edmund Mach Foundation, and Races, resulting in the production of a final report with the title *Open Space technology. Parco del Lagorai, vale la pena pensarci? Report dei lavori*<sup>49</sup> (2010). This was a meeting between various stakeholders and it was called in order to understand whether twenty years after the WWF's proposals there were still the right conditions and good grounds for the establishment of a park. The meeting, however, had a rather unsatisfactory outcome, as no relevant conclusions or even a clear collective prospect emerged.

In addition, the article “Lagorai: ambiente ricco di possibilità interpretative. Per l'avvenire culturale dei vecchi e nuovi parchi naturali”<sup>50</sup> (2010) should also be recalled here. Once again, this article is a valuable contribution in support of the environmental cause for the Lagorai written by Gino Tomasi.

Lastly, it is appropriate to mention the series of workshops *Progetto Integrato per lo Sviluppo Sostenibile del Lagorai*<sup>51</sup> (2015), which was coordinated by the Autonomous Province of Trento within the framework of the Life+ T.E.N project and was structured as a series of meetings and discussion events. The project, first presented at Rifugio Passo Manghen on 20 October 2015, was centred on the involvement of entrepreneurs, associations, and local administrations in the joint effort to outline sustainable development actions for the Lagorai, particularly in the fields of agriculture, tourism, and nature conservation.

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<sup>49</sup> [Translated title] “Open Space technology. A Park for the Lagorai, is it worth thinking about? Work report” (Europe Direct Trentino et al., 2010).

<sup>50</sup> [Translated title] “The Lagorai: an environment rich in interpretative possibilities. For the cultural future of old and new natural parks”.

<sup>51</sup> [Translated title] “Integrated Project for the Sustainable Development of the Lagorai”.

## 2. GEO-HISTORICAL CONTEXT

### 2.1 Geographical and geological framework

The Lagorai mountain range, also known in Italian as “Monti del Lagorai” (literally, Mountains of the Lagorai), is a mountain chain located in northern Italy, specifically in Trentino. It is part of the Southern Limestone Alps and is situated in the central-eastern area of the Italian Alps. It stretches for approximately 70 kilometres, from near Trento (Mount Calisio) and the Valsugana Valley (Mount Panarotta being its southernmost peak) to the Fiemme Valley and the Rolle Pass. The range touches numerous major valleys, some of which are quite densely populated: the Valsugana Valley to the south and southwest; the Vanoi and Primiero Valleys to the south and southeast; the Cembra Valley to the northwest; the Fiemme Valley to the north (Sezioni WWF Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1990). The most relevant minor and side valleys, on the other hand, include the Val Campelle, Val Calamento, Val dei Mòcheni, Valle del Travignolo, Val Tolvà, and Val Cia. Some of these tributary dells, as we shall see, are of great naturalistic value, as they are sparsely inhabited and maintain a high degree of environmental integrity.



Figure 8: The Lagorai mountain range extends from Mount Panarotta, near Levico Terme, to Passo Rolle, near San Martino di Castrozza. Its precise boundaries, however, are always hard to define. The Cima d'Asta massif, for example, is not always considered part of the Lagorai range, at least as regards its geological conformation.<sup>52</sup>

<sup>52</sup> Image created by Enrico Carraro, October 2023.

The Lagorai mountains are characterized by black, reddish, and greenish porphyritic rocks (mainly quartz and orthoclase) formed about 300 million years ago, as a result of intense volcanic eruptive activity. Their origin must therefore be dated to the end of the Palaeozoic Era, i.e. the Permian Period.

The rocks of the Lagorai can be classified into three main subgroups:

- The ignimbrites of the southern part of the Atesine Porphyric Platform, which date back to about 270 million years ago and constitute the actual core of the geological Lagorai. Mountains composed of these ignimbrites are characterised by vertical walls, deep rifts, and very jagged ridges (WWF - Delegazione del Trentino, 1993).



Figure 9: A highly fissured and jagged ridge near the summit of peak Il Frate (2414 m.s.l.). In the background to the right, Passo Sadole and Monte Cauriol (2494 m.s.l.).<sup>53</sup>

- A layer of schists and phyllites, i.e. metamorphic rocks, is mainly to be found along the lower hillsides, from Pergine all the way to Primiero. These rocks comprise the most ancient crystalline basement (300-500 million years old), on which the Lagorai mountain chain rests together with the surrounding Alps. Schists and phyllites are naturally subject to intense erosion and thus result in rounded mountain peaks. The rather friable nature of the rocks can often give rise to frequent landslides of varying magnitude, especially on the steepest rocky slopes. Their accumulated debris forms extensive screes.

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<sup>53</sup> Photograph by Enrico Carraro, July 2022.

This type of metamorphic rocks can be found, for example, along the slopes of the Valle dei Mòcheni, in Panarotta, and along the entire band of mountains between Cimon di Val Orsera, Monte Cengello and Cima Lasteati. Scattered emergences are also visible in other areas and hillsides (WWF - Delegazione del Trentino, 1993).



Figure 10: In order from left to right: Cima Lasteati (2408 m.s.l.), Monte Cengello (2439 m.s.l.), and Forcella delle Buse Todesche. This section of the Lagorai is predominantly composed of metamorphic schists and phyllites, and for this reason it is characterised by rather rounded peaks.<sup>54</sup>

- The Cima d'Asta granite formation, which emerged from the aforementioned basement of schists and phyllites around 280-270 million years ago. These are igneous rocks, rich in quartz and feldspar, and highly resistant to atmospheric weathering. They are clearly visible in the imposing and rugged walls of the Cima d'Asta massif, but can also be found in the reliefs of Rava-Fierollo, Primaluna, Caldenave-Segura, Salubio, in Val Malene, to the north-west of Canal San Bovo, and even between Novaledo and Roncegno (WWF - Delegazione del Trentino, 1993).

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<sup>54</sup> Photograph shot on 35mm Kodak Gold film by Enrico Carraro, April 2023.



Figure 11: The imposing southern wall of Cima d'Asta (2847 m.s.l.), as seen from the emerald Lake of Cima d'Asta (2452 m.s.l.). As can be observed, this granitic mountain peak features smooth walls and a great vertical extension, due to the high degree of resistance to erosion of its igneous rocks.<sup>55</sup>

As we have just seen, from a geological point of view, the Cima d'Asta massif is therefore not a part of the Lagorai, despite being wedged into it on the southern slope. It is in fact an intrusive emergence of purely granitic rocks dating back to the Permian age, and this clearly distinguishes it from the neighbouring mountains, which are instead formed of porphyry (Macera et al., 1994).

Nevertheless, from a geographical and environmental point of view, the continuity between the peaks and woodlands of the Lagorai and the habitats of the Cima d'Asta massif is very clear, and precisely for this reason various scientific experts in the sector as well as mountaineering associations consider the Cima d'Asta massif as a subgroup and thus an integral part of the Lagorai. This is also why past proposals for a natural park have always intended the Lagorai as the whole of the Lagorai, Cima d'Asta, and

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<sup>55</sup> Photograph by Enrico Carraro, August 2023.

Rava mountain groups. As a matter of fact, the Rava Peaks are in themselves part of the Cima d'Asta massif, being a protuberance of the latter that stretches south for several kilometres (Club Alpino Italiano - Sezione di Bassano del Grappa, 2016).



Figure 12: The Cima d'Asta massif stands as an enormous granitic emergence by itself, which nonetheless is perfectly embedded in the Lagorai mountain chain. It is connected to the rest of the Lagorai by the mountain passes Forcella Magna and Forcella di Val Regana.<sup>56</sup>

The Cima d'Asta peak is regarded as the highest in the Lagorai, standing at 2847 metres above the sea level. The highest peak of the "geological" Lagorai, however, is indeed Cima Cece, with an elevation of 2754 metres above the sea level.

Other major peaks of the Lagorai, Rava and Cima d'Asta groups include - in order of elevation:

- Cima dei Diavoli - 2806 m.s.l. (Cima d'Asta Group)
- Col del Vento - 2636 m.s.l. (Cima d'Asta Group)
- Cima Lastè delle Sute - 2626 m.s.l.
- Cima delle Stellune - 2606 m.s.l.
- Monte Colbricon - 2602 m.s.l.
- Cima del Passetto, 2589 m.s.l. (Cima d'Asta Group)

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<sup>56</sup> Photograph by Enrico Carraro, August 2023.

- Sasso Largo, 2551 m.s.l. (Cima d'Asta Group)
- Cima Litegosa - 2548 m.s.l.
- Cima Trento, 2530 m.s.l. (Rava Group)
- Cima Brunella, 2526 m.s.l. (Rava Group)
- Cima Moregna - 2517 m.s.l.
- Cima Busa Alta - 2513 m.s.l.
- Monte Cauriol - 2494 m.s.l.
- Col Verde, 2488 m.s.l. (Cima d'Asta Group)
- Cima Orsera, 2471 m.s.l. (Rava Group)
- Cimon Rava - 2436 m.s.l. (Rava Group)
- Col della Croce - 2423 m.s.l.
- Monte Rujoch - 2415 m.s.l.
- Cima Buse Todesche - 2413 m.s.l.
- Campagnassa, 2409 m.s.l. (Cima d'Asta Group)
- Cima Cengello - 2408 m.s.l.
- Cima Lasteati - 2408 m.s.l.
- Cima Sette Selle - 2396 m.s.l.
- Monte Gronlait - 2383 m.s.l.
- Punta Socède, 2376 m.s.l. (Cima d'Asta Group)
- Cima Valpiana - 2368 m.s.l.
- Cima del Frate, 2351 m.s.l. (Rava Group)
- Monte Fravort - 2347 m.s.l.
- Monte Tolvà - 2343 m.s.l.
- Cima Primaluna, 2314 m.s.l. (Rava Group).
- Cima Panarotta - 2002 m.s.l.<sup>57</sup>.

Over millions of years, the Lagorai has been profoundly shaped by various geological phenomena, first and foremost those that led to the formation and then the emergence from beneath the Ocean of the entire eastern part of the Alps. Indeed, the influence of the Pleistocene Quaternary glaciations “was of primary importance for the formation of the landscape that still characterises the [entire] Alps and the central-eastern Pre-Alps

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<sup>57</sup> Altitudes retrieved from Lagorai - Cima d'Asta: La più estesa, 2023.

today, especially with regard to the presence of the great glacial valleys and large lakes”<sup>58</sup> (Carton, 2005). Specifically, the glacial phenomena of the Würmian phase (between 75,000 and 15,000 years ago) deeply moulded the Lagorai territory, carving out large U-shaped valleys, leaving enormous deposits of moraine debris, and polishing entire hillsides (WWF - Delegazione del Trentino, 1993).

The numerous glacial cirque lakes in the Lagorai are also one of the main traces of that period. There are more than a hundred of them in the entire mountain range, and they all have varying sizes and depths. In many cases, these are small lakes that in the short and medium term are destined to disappear completely or become high-altitude swamps and peat bogs, as a result of the slow but constant accumulation of debris and sediment at the bottom of the lakes (Tomasi, 1963).



Figure 13: Lago della Cavallazza (2138 m.s.l.), a typical glacial cirque lake in the north-eastern Lagorai.<sup>59</sup>

Therefore, the landscapes that we can admire today in the Lagorai are undoubtedly the result of hundreds of millions of years of orogenesis, but also and above all of the

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<sup>58</sup> [Original quotation] “è stata di primaria importanza per la formazione del paesaggio che caratterizza ancor oggi le [intere] Alpi e le Prealpi centro orientali, soprattutto per quanto riguarda la presenza delle grandi valli glaciali e dei grandi laghi” (Carton, 2005).

<sup>59</sup> Photograph by Enrico Carraro, July 2022.

levigating action of glacier ice, which in the course of the last glaciation gave the mountain range the appearance it has today.

## 2.2 Historical framework

When trying to reconstruct the patterns of prehistoric frequentation of the Lagorai, it is worth remembering first of all that studies and "data show that the southern sector of the Alps had already been populated by groups of Neanderthals since the advanced stages of the Middle Pleistocene, approximately 300 thousand years ago"<sup>60</sup> (Angelucci, 2021), and that perhaps these areas had also been colonised by the ancestors of the Neanderthals, i.e. by individuals of the species *Homo heidelbergensis*.

The first certain human presence in the Lagorai, however, must probably be dated around 40,000 years ago, i.e. between the Middle and Upper Palaeolithic, in the Würmian interpleniglacial period. At the time, groups of hunters would wander the mountains to track down prey and procure the food necessary for the survival of the human groups that mainly lived at intermediate altitudes, on the slopes of the mountain range. What is known for certain is that at that time, *Homo neanderthalensis* and *Homo sapiens* still coexisted in the Alpine arc, and therefore the Lagorai was most probably regularly visited by both species, as well as by hybrid individuals born from cross-breeding between Neanderthals and Sapiens individuals.

However, no significant archaeological evidence remains of this very ancient human presence in the Lagorai. This is probably due to the formation, at around 25,000 years ago, of enormous glaciers that completely filled the Alpine valleys, stretching as far as the Po river. "The vigorous erosive action of the Pleistocene glaciers", in fact, led to a drastic "removal of a large part of the pre-existing sediments and of any archaeological traces they contained"<sup>61</sup> (Angelucci, 2021).

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<sup>60</sup> [Original quotation] "i dati mostrano come il settore meridionale delle Alpi fosse già stato popolato da gruppi di neandertaliani fin dalle fasi avanzate del Pleistocene Medio, indicativamente da circa 300 mila anni fa" (Angelucci, 2021).

<sup>61</sup> [Original quotation] "L'energica azione erosiva dei ghiacciai pleistocenici ha portato alla rimozione di buona parte dei sedimenti preesistenti e delle eventuali tracce archeologiche contenute in essi" (Angelucci, 2021).

Moreover, it was precisely between 24,000 and 15,000 years ago, at the very peak of the last Würmian glacial maximum, that the re-intensification of cold weather patterns and the reappearance of glacial ice on the slopes of the mountains, in the hills and in the valleys, forced groups of hunters to abandon the Lagorai and move southwards in search of milder temperatures. Generally speaking, not only the Lagorai but “the entire alpine territory was abandoned by the hunter communities of which we only find a few traces in the hills of the Po Valley (Colli Berici)”<sup>62</sup> (Lanzinger & Ponzetta, 1997). It was this new cooler phase, or perhaps competition with larger and better-structured Sapiens groups, that led among other things to the final extinction of the Neanderthals, who were everywhere supplanted by our direct ancestors, the Sapiens.

Between 18,000 and 15,000 years ago, with the gradual warming process of the late glacial period, the Alps underwent a gradual re-emergence of grassland vegetation at medium altitudes and the parallel spread of herds of herbivores, especially chamois and ibex. It was during this period, over a span of about 5,000 years, that Homo sapiens made a fairly rapid comeback in various areas of the Lagorai, as witnessed by findings at various sites - for example, the Riparo Villabruna along the Cismon torrent, between Primiero and Fonzaso. Moreover, this 'recolonisation' of the Lagorai took place on both directions, thus on both the Atesino and Feltre mountainsides. It is most likely that this new colonisation was primarily carried out by “groups from the Po Valley area and the Adriatic area”<sup>63</sup> (Angelucci, 2021). From there onwards, presumably, the human presence in the Lagorai never stopped.

Of exceptional archaeological significance, in particular, are the traces left in the mountain range by our ancestors during the Mesolithic period, between 10,000 and 8,000 B.C., i.e. at the time of the “raising of the upper limit of the forests [...] to] altitudes comparable with today. In this new environmental setting, the hunting of prairie ungulates, which continues to remain the preferred food foraging source in the context of such a hunting and gathering economy, inevitably had to move further inland [...] and to higher altitudes”<sup>64</sup> (Lanzinger & Ponzetta, 1997).

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<sup>62</sup> [Original quotation] “l'intero territorio alpino fu abbandonato dalle comunità dei cacciatori dei quali troviamo poche tracce solo negli apparati collinari padani (Colli Berici)” (Lanzinger & Ponzetta, 1997).

<sup>63</sup> [Original quotation] “gruppi provenienti dall'area padana e dall'area adriatica” (Angelucci, 2021).

<sup>64</sup> [Original quotation] “innalzamento del limite superiore dei boschi [...] a] quote confrontabili con l'attuale. In questo nuovo scenario ambientale, la caccia agli ungulati di prateria, che continua a

Thanks to the retrieval and investigation of various archaeological findings, archaeologists have succeeded in reconstructing the lifestyle habits of the hunter-gatherers who inhabited the Lagorai at that point in prehistory. On the one hand, the presence of tools suitable for processing foodstuffs (scrapers, chisels, blades) on the banks of the small lakes at medium and high altitudes, and on the other hand of spears and other objects used for hunting at higher altitudes and along the ridges, has allowed a better understanding of the settlement patterns of the Mesolithic Alpine period.

The evidence of human habitation in the vicinity of high-altitude alpine ponds shows the presence of large and organised base camps, where groups of hunters settled during the warmer periods at high altitudes. Not far from these base camps were also lithic workshops, geared towards the manufacture of tools and microlithic armour (Pasquali, 1987).

Findings at higher altitudes and in more exposed locations, on the other hand, suggest hunting sites or lookout and sighting positions. The coeval occurrence of campsites also across the various valley bottoms of the Atesine area made it possible to assume the existence of a pattern of seasonal nomadism by which human groups would move to higher altitudes in warmer periods, in order to hunt, and then would later return to lower altitudes in winter. It seems that occasionally some individuals of these hunting groups would travel over much greater distances, eventually coming into contact with different human groups across the Eastern Alps. This hypothesis seems to be corroborated by the numerous archaeological finds in the Lagorai of flint artefacts from areas outside the mountain range, such as the Prealps of Feltre (Lanzinger & Ponzetta, 1997).

Indeed, the sites occupied during the Mesolithic were “often strategically located, in positions of environmental convergence if they were residential, in geomorphologically recurring locations if they were temporary camps”<sup>65</sup> (Angelucci, 1998), and human groups therefore based their survival on hunting as well as the accumulation and

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permanere la fonte alimentare privilegiata nel contesto di un'economia di caccia e di raccolta, doveva per forza di cose spingersi più all'interno [...] e a quote più rilevate” (Lanzinger & Ponzetta, 1997).

<sup>65</sup> [Original quotation] “spesso collocati strategicamente, in posizione di convergenza ambientale se residenziali, in località ricorrenti geomorfologicamente se campi temporanei” (Angelucci, 1998).

transport of food supplies sourced from different environments and then stored in various residential locations (Angelucci, 1998).

This knowledge of the prehistory of the Lagorai, however, is rather recent. Before the 1970s, in fact, the human history of Trentino was thought to only go back to the Metal Ages. The decisive element that made it possible to backdate the history of the region by several thousand years was the fortuitous discovery, in 1971 near the small lakes of Colbricon (in the north-eastern Lagorai, near Passo Rolle and on the edge of the Dolomite zone), of some manufactured flints (Bagolini & Dalmeri, 1987). This event marked the beginning of an intense excavation campaign, initially conducted under the guidance of the archaeologist Bernardino Bagolini, and then furthered over the following decades by other scholars, which resulted in the identification of no less than nine prehistoric sites around the two small Colbricon lakes.

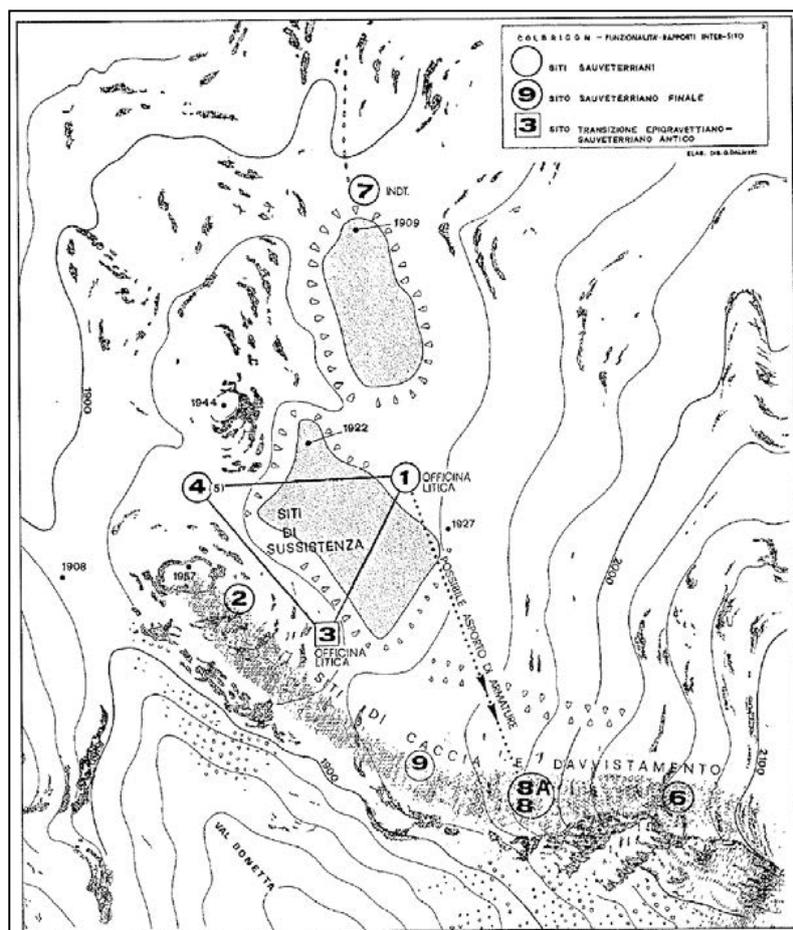


Figure 14: The 9 Mesolithic sites excavated by Bernardino Bagolini and his team near the alpine lakes of Colbricon (Laghi di Colbricon).<sup>66</sup>

<sup>66</sup> Image from Bagolini & Dalmeri, 1987.

The abundance of archaeological finds has made it possible to recognise and distinguish “subsistence sites, workshops, and sites for hunting and spotting. Some sites appear to have been occupied for a single one of these functions, while others are distinguishable for having been repeatedly visited, sometimes with a variation in the activities carried out there”<sup>67</sup> (Angelucci, 1998).

Even with regard to the settlements at the Colbricon lakes, however, it must always be borne in mind that these were areas where human presence was not stable throughout the year, but rather episodic and seasonal (Bagolini & Dalmeri, 1993).

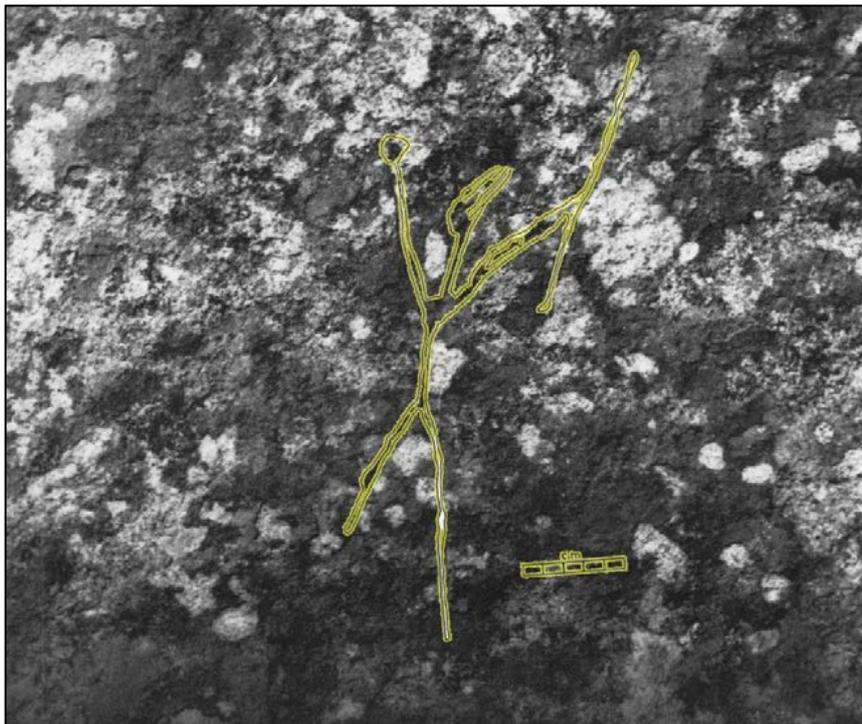


Figure 15: An anthropomorphic petroglyph near the lower Colbricon Lake (which we have highlighted for enhanced visibility). This small rock engraving depicts in a stylised manner a male figure standing with his arms outstretched and holding a spear (or stick) in his right hand and a shield (or some other round object) in his left hand. Archaeologists are still hesitant to assign a precise date to the work, but there are indications that it may date back to the Mesolithic, the Eneolithic or the Bronze Age (Leonardi & Sartorelli, 1984).<sup>68</sup>

Other excavations and investigations carried out along the entire length of the Lagorai mountain range have also brought to light bivouacs, sighting sites, hearths, and traces

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<sup>67</sup> [Original quotation] “siti di sussistenza, officine, e siti di caccia e avvistamento. Alcuni siti risultano essere stati insediati per una sola di queste funzioni, mentre altri si caratterizzano per l’essere stati frequentati più volte, talora con una modificazione delle attività svoltevi” (Angelucci, 1998).

<sup>68</sup> Image adapted by Enrico Carraro from Leonardi & Sartorelli, 1984.

of various kinds scattered in correspondence with many small mountain saddles and lakes (Lanzinger, 1989).

It is no coincidence that the function of the various Mesolithic sites in the Lagorai seems to depend very much on the specific morphology of the area. In the transit zones at the eastern and western ends and in the centre of the mountain range, one has "the impression that there are passages with great potential for movement, transit between the two sides and diffusion at high altitudes, such as the areas near Colbricon - Passo Rolle, the Stellune Lake - Forcella del Montalon, and the area near Col Manghen". On the other hand, those sites "with modest concentrations of material can be seen as occasional bivouac sites"<sup>69</sup> (Bagolini & Pasquali, 1984).

The list of sites in the Lagorai where Mesolithic indications of human presence and in some cases even Palaeolithic traces have been identified is really extensive: Alpe Miesnota, Bualon di Cima d'Asta, Busa della Val di Mattio, Castel Vedro, Col S. Giovanni, Pian della Maddalena (opposite), Forcella del Montalòn, Forcella Ravetta, Gini di Seregnano, Laghetti di Colbricon, Laghetti del Lagorai, Laghi delle Buse Basse, Lago delle Buse, Lago del Lagorai, Lago del Montalòn, Lago d'Esze, Lago delle Trote, Lago di Calaita, Lago delle Stellune, Malga Arpaco, Malga Buse, Malga delle Buse del Sasso, Malga Fosse di Sopra, and other sites (de Battaglia, 1989).

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<sup>69</sup> [Original quotation] "l'impression que il existe des situations de passage avec de grandes possibilités de déplacement, de transit entre les deux versants et de diffusion en altitude comme: l'aire Colbricon-Rolle, Lac delle Stellune, Forcella del Montalon, l'aire du Col Manghen. [...] et se manifester, avec de modestes concentrations de matériel, comme sièges de bivouacs occasionnels" (Bagolini & Pasquali, 1984).

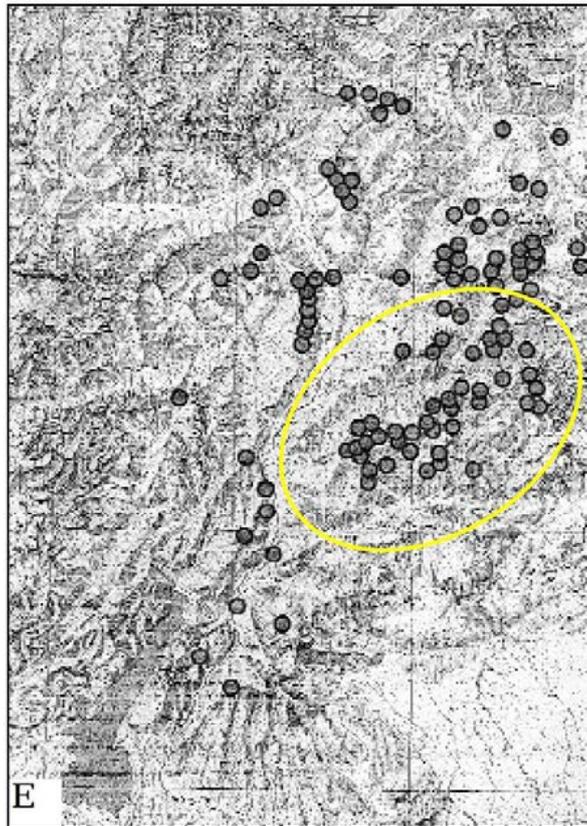


Figure 16: The distribution of Mesolithic sites in most of the Trentino-Alto Adige region. Highlighted in yellow is the area that roughly corresponds to the Lagorai mountain range, which has one of the highest concentrations of sites dating back to the Mesolithic Age. In fact, today there are even more archaeological sites than those shown in this illustration.<sup>70</sup>

Over the following millennia, humans continued to visit the Lagorai without interruption. At a certain point, however, the range (especially in its south-western part) became important for another human activity besides those which had previously been practised: metallurgy.

Both the crystalline basement of Cima d'Asta and the nearby Atesina Porphyritic Platform, which includes the Lagorai, are in fact characterised by the presence of various metal-bearing rocky outcrops, all most probably dating back to a single metallogenic period (Murara, 1966).

This richness of the subsoil and the presence of a number of superficial mineral outcrops attracted towards the Lagorai and its immediate surroundings various human groups interested in the extraction of metallic minerals (chalcopyrite, pyrite) as well as non-metallic ones (quartz, calcite, fluorite).

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<sup>70</sup> Image adapted by Enrico Carraro from Lanzinger & Ponzetta, 1997.

Evidence of intense mining activity is mainly found near Pinè, in Panarotta, in the Tesino Valley, in the Cavé Valley, and in the Mòcheni Valley. Some of the remains show a rather rudimentary type of mining activity, while in other later sites it is possible to observe far more advanced metal extraction and processing techniques (Preuschen, 1973). Consider, for example, the battery of nine furnaces found by archaeologists in the Acquafredda locality at the Redebus Pass (Municipality of Bedollo), the alpine pass by which the Mòcheni Valley is linked to the nearby Piné Plateau. These furnaces date as far back as the Recent Bronze Age (1350-1200 B.C.) and Final Bronze Age (1200-700 B.C.) (Fabbro, 2003). Together with the enormous slag deposits present in the vicinity, which reach a height of nearly two metres, these furnaces “provide an idea of the almost proto-industrial level reached by smelting activity. The intensive production of copper implies a rigid and complex organisation and a strong control of the resources of the territory and, therefore, of the exchange mechanisms”<sup>71</sup> (Marzatico, 1997, as cited in Marzatico, 2003). It is therefore plausible that already at that time “the human presence or at least human activities had a rather widespread character”<sup>72</sup> (Marzatico, 2003).

There was then the spread of the Rhaetian culture in Trentino, which broadly corresponds in geographic reach to the so-called Fritzens-Sanzeno Culture, or Fritzens-Sanzeno Group. Archaeological finds such as iron tools (hoes, axes, keys), bronze ornaments, and mixed stone and wood dwelling foundations are well documented for this historical phase (Second Iron Age, between the 5th and 1st centuries BC). The settlements of the Fritzens-Sanzeno Culture were mostly located on naturally defensible rises, terraces, conoids, or even in easily accessible areas. The village of Montesei di Serso, located near Pergine Valsugana and thus along the central-western slopes of the Lagorai, belongs to the latter kind of settlements (de Finis, 1996).

The Rhaetian populations living in Trentino, also mentioned by Pliny, were several: Tridentines, Tublindates, Anauni, Stoni, and Flemonienses. Together with them lived

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<sup>71</sup> [Original quotation] “forniscono un’idea del livello quasi proto-industriale raggiunto dall’attività fusoria. La produzione intensiva del rame implica una rigida e complessa organizzazione e un forte controllo delle risorse del territorio e, quindi, dei meccanismi di scambio” (Marzatico, 1997, as cited in Marzatico, 2003).

<sup>72</sup> [Original quotation] “la presenza o comunque le attività umane avessero un carattere piuttosto diffuso” (Marzatico, 2003).

the Cenomani Gauls, at least during the 6th century; some traces of their language remain in the local toponymy (de Battaglia, 1989).

It is certain that also during the Rhaetian period, the Manghen Pass and the Rolle Pass, two of the main passes providing access from one side of the Lagorai chain to the other, continued to fulfil their function of major communication routes.

It was in Roman times, however, that the Alpine passes became crucial landmarks for the partitioning of the territory. It is also a widely shared opinion among experts that “[in Trentino] the Romans used pre-existing routes from prehistoric times for their movements, and in some cases converted them into proper roads”<sup>73</sup> (de Finis, 1996).

The Lagorai, given its location in eastern Trentino, was however marked by no more than a discrete presence of Roman civilisation, which was instead much more active in western Trentino, an area highly favoured for its geo-morphological characteristics, climate, and road network.

Nonetheless, a Roman historical trace found in the Lagorai is of great significance. We are referring here to a border inscription dating back to the imperial period, located in the Cadino Valley, near Passo Manghen and Lago delle Buse. It is engraved on a sheer rocky wall of Monte Pergol, in a rather inaccessible position. This inscription, which reads *FINIS INTER TRID(entinos) et FELTR(inos) LIM(es) LAT(us) P(edes) IIII* (translated from Latin: “Boundary between the Tridentini and Feltrini [people], borderline 4 feet wide”), was for certain an official indication marking the limit between the countryside of the municipium of Feltre (which in Roman times belonged to the Menenia tribe) and of the municipium of Trento (belonging to the Papiria tribe).

While the Roman origin of the demarcation inscription on Monte Pergol is by now almost certain, based on the studies of numerous experts, it is still difficult to understand its actual practical usefulness. In fact, the inscription “is not at all located in an easily visible spot, it does not divide anything punctually and it is therefore not

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<sup>73</sup> [Original quotation] “i Romani abbiano sfruttato per i loro spostamenti dei percorsi già esistenti dall’età preistorica, trasformandoli in alcuni casi in vere e proprie strade” (de Finis, 1996).

very logical to imagine [...] any practical use, despite the considerable investment of time and resources required for its realisation"<sup>74</sup> (Angelucci et al., 2019).

One thing that is certain, however, is that in the Roman period the territory of the Lagorai was divided between two municipia: the Feltrine municipium to the south, and the Tridentine municipium to the west and north. The usage of these mountains at the time was probably relatively simple, linked to trade and some agro-pastoral activities. In fact, the economy of the valleys that intersected the Lagorai was modest, being based on livestock farming, a few cultivated crops and hunting. The slopes of the mountains that surrounded these valleys also represented an essential source of timber, pastures, hay, and game.

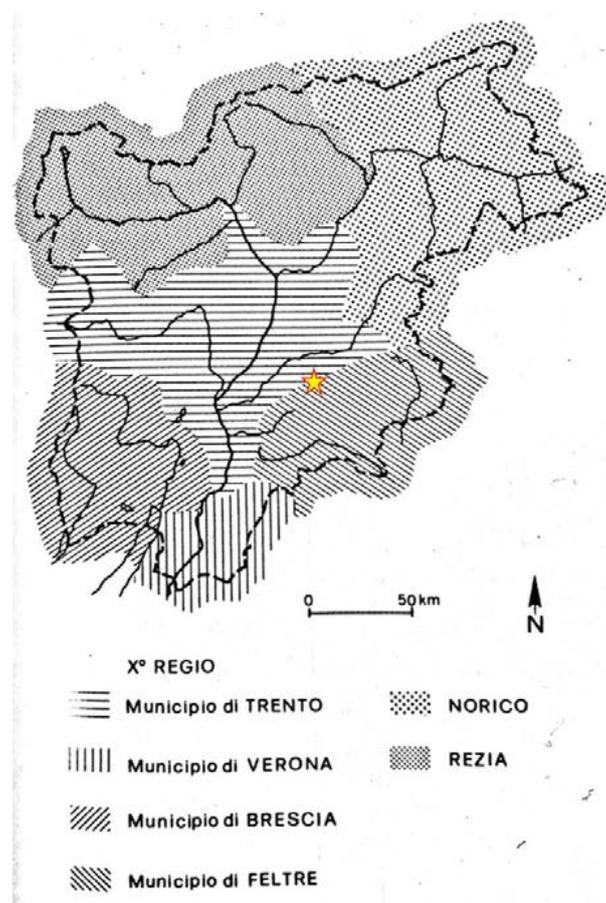


Figure 17: The ancient borders between the different roman municipia in Trentino - Alto Adige. The yellow star indicates the approximate position of the inscription on Monte Pergol.<sup>75</sup>

<sup>74</sup> [Original quotation] “non si trova affatto in un punto di facile visibilità, non divide puntualmente alcunché ed è quindi poco logico immaginare [...] una qualche utilità pratica, nonostante l’ingente investimento di tempo e risorse necessario per la sua realizzazione” (Angelucci et al., 2019).

<sup>75</sup> Image adapted by Enrico Carraro from de Finis, 1996.



Figure 18: The Roman inscription on Monte Pergol. As can be seen from the image, the rock on which the Roman inscription is engraved (which we have outlined in yellow for enhanced legibility) is barely visible and accessible.<sup>76</sup>

Clearly, human activities in the Lagorai did not stop with the fall of the Roman Empire. On the contrary, in the Middle Ages the exploitation of the mountains became more intense. In many areas there was in fact a full-fledged planned colonisation of low and medium mountain forests and pastures. This expansion of settlements along the mountainsides was common to a large part of Trentino and in fact represented "the first great phase of Alpine colonisation after the Rhaetian and Roman colonisation"<sup>77</sup> (de Battaglia, 1989).

Local communities began to harvest considerable quantities of timber, and numerous copper, silver and lead mines were also opened. Most emblematic in this respect was the issuing of the *Codex Vangianus* (1215) by Federico Vanga, the Prince-Bishop of Trento. This cartulary also included the *Liber de postis Montis Argentariae*, incorporated in the 9th fascicle of the *Codex Minor* and today reckoned to be the oldest European collection of mining regulations.

<sup>76</sup> Image adapted by Enrico Carraro from <https://tinyurl.com/y9yexra7> - Iscrizione romana sul Monte Pergol (Agh - Alessandro Ghezzer, 2014) and from Angelucci et al., 2019.

<sup>77</sup> [Original quotation] "la prima grande fase della colonizzazione alpina dopo quella retica e romana" (de Battaglia, 1989).

An example of the exploitation of the mineral resources of the Lagorai can be observed in the Mòcheni Valley, an area which was first colonised by Bohemian and Bavarian peasants, whose immigration was favoured during the 14th century by the local landlords of Scena, and then also by conspicuous groups of expert miners coming from central Europe, known as *canòpi*.

Another very significant event for the Lagorai was the emergence of the so-called *Comunità* (“Communities”), which at first were merely regulated by oral laws, but were later given written *Regole* (“Rules”) and Statutes, which were officially recognised by the prince-bishop of Trento and other authorities.

On 19 June 1312, for example, Prince-Bishop Gebardo established the *Magnifica Comunità di Fiemme* (“Magnificent Community of Fiemme”), decreeing that the inhabitants of the valley owed a single annual contribution to the prince-bishop and that the *Comunità* was therefore to be treated in the same fashion as a noble feudal lord, with its own local administrative and legislative powers. The privilege of the inhabitants of the Fiemme Valley was also confirmed in 1339 by the ruling prince-bishop of Trento Nicolò Alreim (de Battaglia, 1989).

The Magnifica Comunità di Fiemme was presided over by the *Scario*, who was assisted in his government duties by a sort of “senate” of the valley composed of the *Regolani*. Today, both the figures of the *Scario* and the *Regolani* still exist, and the *Comunità* of the Fiemme Valley retains its autonomy, which however has been adapted to the requirements and political practices of the present time.

Therefore, if action is to be considered today to enhance the environmental protection of the Lagorai, it would be impossible and unfair to exclude the Magnifica Comunità di Fiemme from any discussion table. It is in fact an institution that has contributed for centuries, along with the Communities of the other valleys, to define the way in which the Lagorai mountains have been used and administered, albeit with some inevitable flaws.



Figure 19: In the village of Cavalese stand the Church of San Sebastiano and Palazzo degli Scari, now Palazzo della Magnifica Comunità di Fiemme. This magnificent structure originally served as the summer residence for the prince-bishop of Trento.<sup>78</sup>

In 1367, the *Comunità di Primiero* (“Primiero Community”) also acquired its own system of Rules, which were often very strict but aimed at the absolute protection of the assets and internal order of the whole community. Other Communities also existed: those of Pieve Tesino, Grigno, Castello Tesino, and others.

It is fair to point out that these communities that surrounded the Lagorai were often characterised by economies that were anything but poor. The prosperous wool and timber trade with Venice, Lombardy and the Tyrol allowed the Fiemme, Tesino, Primiero and Valsugana valleys to flourish.

Among other things, it is important to note that it was during the Middle Ages that the denomination “Lagorai” made its first appearance. In fact, in a contract from 1289 concerning the sale of a plot of land by the Lord of Telve to the Community of Pieve Tesino, the toponym *Legolare* is explicitly mentioned (de Battaglia, 1989).

For the purpose of this reconstruction of the history of the Lagorai, we have decided to omit the Modern Age phase, since in this period the Lagorai mountain range did not undergo any particular changes in its natural features. The only novelties regarded the

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<sup>78</sup> Photograph from Visit Fiemme – [www.montagnadiviaggi.it](http://www.montagnadiviaggi.it)

varying ways in which forests, pastures and cultivated land were administered first by local Communities and then by the imperial and Austrian authorities.

This historical overview will now move directly to the years leading up to the First World War, an event that marked in a truly dramatic and thorough manner both the physical appearance of the Lagorai mountains and the fates of the people who dwelled there.

Since before the war, the Austro-Hungarian Corps of Engineers had selected the area of the Lagorai mountain range between the Brenta river and the Cison torrent as part of the front on which to entrench and defend themselves in the event of an attack launched from the south. It was in fact a rugged territory that was ideal for blocking the enemy and preventing a threat to the Brenner supply route, which if it were to fall into enemy hands would have opened a gateway into the very heart of Austria. The initial plan was to heavily fortify the summit of Mount Panarotta, so as to create a single and solid defensive line in Valsugana together with the pre-existing Fort Vezzena (on the Pizzo di Levico), Fort Tenna (on the high ground separating the lakes of Levico and Caldonazzo), and Fort San Biagio (on the other side of Lake Levico). This network of fortifications was to be connected through trenches and emplacements at the bottom of the valley to the extremely secure array of forts already existing on the Altopiano dei Sette Comuni.

The sudden escalation of wartime events and the Italian entry into the war on 24 May 1915, however, forced the Austro-Hungarian Corps of Engineers to change their strategy. In fact, there was neither the time nor the necessary tranquillity to build the proper system of impregnable forts that had previously been planned. It was therefore necessary to find an alternative solution, one that did not involve such massive fortifications as those of the Lavarone and Folgaria Plateaus (consider, in this regard, the mightiness of the Vezzena and Busa di Verle Forts).

Given this lack of time, only artillery positions, trenches, tunnels, and casemates were eventually built in Panarotta. A similar fate befell Monte Croce (or Kreuzspitze, 2490 m.s.l.), which became the main stronghold of the Austro-Hungarian battlefront in the Lagorai (Fabbro, 2003).

The major military function of Monte Croce, in particular, was based on its geographical location: it was in fact only around ten kilometres as the crow flies from Egna and Ora,

two strategic locations for the transit of resupplies coming from Austria through the Brenner Pass. Losing this peak would have meant exposing the Adige Valley and its infrastructure to enemy artillery fire from up high and up close. From Panarotta to Passo Rolle, therefore, every pass, ridge and summit was garrisoned without interruption. From there, the front extended even further eastwards, up to the Marmolada and beyond.

It must be said, however, that the Austro-Hungarian generals themselves had long envisioned the Lagorai as a minor front; the ruggedness of its terrain, the scarcity of communication routes that traversed it, and the length of the valleys descending from the main ridges into the Fiemme Valley already seemed to be sufficient obstacles to ward off the chance of a successful Italian attack across the mountain chain (de Battaglia, 1989).

The Lagorai range, it should be said, throughout the entire First World War did not become the theatre of battles of particularly large scale. On the other hand, the ruggedness of the terrain and the steepness of the slopes prevented mass attacks on the trenches and kept the two Italian and Austrian fronts at a relatively large distance, in the midst of which a sort of "no man's land" was often formed. Therefore, the fighting was mainly conducted by means of artillery fire and with strategic attacks by small squads of soldiers on posts and trenches. In spite of this, the Lagorai front was still a bloody battleground, in which for several years many men suffered in vain, amidst rocks and ice.

The operations on the Lagorai front were mainly conducted in three phases:

- The first phase began with the Italian entry into the war on 24 May 1915 and it culminated with the so-called Austro-Hungarian *Strafexpedition* in the first half of 1916. Initially, the troops of the Central Empires settled on positions that were convenient to defend, leaving the southern slope of the Lagorai to the Italian forces. The Italian forces thus entrenched themselves on Forcella Valsorda, Cime d'Arzon, the mountains between Canal San Bovo and Caoria, Val Regana, Cimon Rava, Cima d'Asta, and Forcella Magna, the true stronghold of the entire sector. The Austrian Spring Offensive, however, overwhelmed these Italian positions and pushed the front a little further to the south.

- The second phase consisted of the Italian counter-offensive in the summer and autumn of 1916, in response to the semi-failed Austrian *Strafexpedition*. During this stage of the war, the Italian infantry forces frequently clashed with the Austro-Hungarian ones in a bloody manner, causing frequent changes in the position of the frontline. The Italian forces managed to reconquer part of the lost positions and establish a new front in the Lagorai. After various defence and counter-offensive operations, the Italian front in the Lagorai settled on Colbricon, Cima Ceremana, Forcella Valmaggioro, Monte Cauriol, Cardinal and Busa Alta.
- The third phase corresponded to the operations carried out between the late spring and autumn of 1917, “to 'work the flanks' of the Austro-Hungarian line-up in view of the push on Bainsizza that was supposed to crack open the gateway to central Europe”<sup>79</sup> (de Battaglia, 1989). During this stage of the war, some of the peaks of the Lagorai suffered heavy damage, no longer caused solely by artillery fire, but also by the extensive use of massive explosive charges placed in tunnels dug right under the peaks occupied by the enemies.

This last phase of the war in the Lagorai ended with the Caporetto offensive in November 1917, which brought about the Italian defeat (along with a few episodes of valiant Italian resistance, especially on the most fortified peaks). After this devastating offensive, the actual front moved about a hundred kilometres to the south, along the Piave and Grappa lines, and the severely battered Lagorai finally stopped being a battlefield.

As a result of the First World War, the Lagorai landscape underwent significant changes, which are still visible today. The mountains bear evidence of the ravages of war, including trenches, tunnels, barbed wire, decaying planks, ditches, and impact craters caused by mountain artillery pieces and howitzers fired from the valley floor towards the peaks.

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<sup>79</sup> [Original quotation] “per 'lavorare ai fianchi' lo schieramento Austriaco in vista dello sforzo sulla Bainsizza che avrebbe dovuto aprire il varco verso l'Europa centrale” (de Battaglia, 1989).

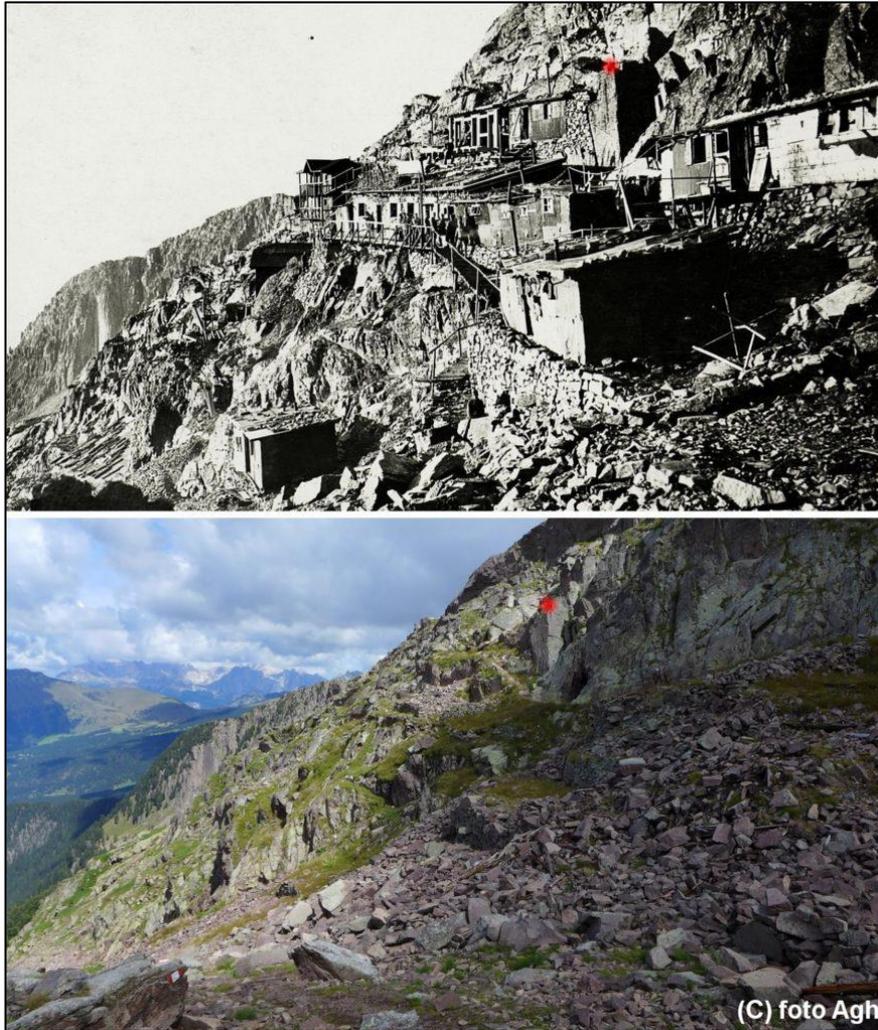


Figure 20: A repeat photography image showing an Austro-Hungarian camp at Forcella Ceremana (Lagorai). The red dot on the dihedral boulder is a sure identifier for this location.<sup>80</sup>

The effects of the war, however, were also and above all experienced by the local population living in the valleys around the Lagorai. Many people were forced to abandon their homes and fields to join the army, and many more saw their modest possessions plundered or destroyed.

Ottone Brentari, an irredentist geographer and historian native of Strigno, in the immediate aftermath of the First World War described the state of the valleys around the Lagorai as follows: "those who approach any of these villages immediately think of what they have seen during the most vigorous earthquakes or in the most furious fires; roofless houses to which nothing remains but the empty eyes of their windows and the

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<sup>80</sup> Repeat photography image by Agh - Alessandro Ghezzer, 2019 - [www.fotoagh.it](http://www.fotoagh.it).

blackened crumbling walls; pieces of walls that look like scrawny arms praying to the trembling heavens for mercy"<sup>81</sup> (Brentari, 1919).

In some cases, there were literal deportations of members of the local population. Many children, women, and elderly people of the village of Caoria, for example, were deported to refugee internment camps, in order to prevent their fraternisation with the Italian invaders. Similarly, after the war had ended, the male villagers of Primiero and Canal San Bovo, who had just returned home after serving amongst the ranks of the defeated Austro-Hungarian army, were captured by the Italians as POWs, and detained for three months in a prison camp in Isernia.

In the decades following the end of the conflict, the most internal and predominantly pastoral areas of the Vanoi, Tesino and Valsugana were never able to fully recover from the devastation wrought by the war. The Valsugana, for example, despite not having been directly affected by major clashes or warfare, was nonetheless heavily damaged by the pillaging and multiple artillery bombardments carried out by the Austro-Hungarian forces (one significant example is the devastating bombardment of Castello Tesino in 1916).

As pointed out by de Battaglia, the various reconstruction projects implemented as early as the 1920s in several valleys were not sufficient to prevent a widespread and consistent trend of displacement and depopulation. Unfortunately, "the link between population and territory had been broken, the oral transmission of traditions had been interrupted, and a vacuum of productive generations and ruling class had been produced"<sup>82</sup> (de Battaglia, 1989).

Nevertheless, it must be said that not all valleys suffered to such a great extent from the effects of the war. Some of them, given their proximity to the mountain range, took on tremendous strategic importance during the war years. The Mòcheni Valley, for example, became the back line of the Austro-Hungarian front, and thus the centre where supplies and equipment destined for the soldiers stationed at high altitudes were

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<sup>81</sup> [Original quotation] "chi si avvicina a qualcuno di questi paesi, corre subito col pensiero a quanto ha visto in occasione dei più vigorosi terremoti o negli incendi più furiosi; case scoperchiate alle quali non restano che le vuote occhiaie delle finestre e le mura cadenti annerite; brani di muraglioni che sembrano braccia ischeletrite che pregano al cielo tremanti per chiedere pietà" (Brentari, 1919).

<sup>82</sup> [Original quotation] "spezzato il legame fra popolazione e territorio, s'era rotta la trasmissione orale delle tradizioni, s'era creato un vuoto di generazioni produttive e di classe dirigente" (de Battaglia, 1989).

sorted. Many men from the Mòcheni people were conscripted into the Austro-Hungarian troops, but more frequently they were left to work on their farms so that they could carry on agricultural activities and supply food to feed the soldiers. Women also assisted the war effort, frequently taking on the burden of carrying supplies and food to the frontline high up in the mountains.

The Austrians, for their part, contributed to the modernisation and militarisation of the valley's infrastructure. This was obviously done not out of any particular benevolence towards the inhabitants of the Mòcheni Valley, but rather to improve the connections between the valley floor and the front line.

Therefore, from 1914 to 1917, a number of valleys on both the Austrian and Italian sides underwent multiple interventions on their territory: new carriage roads were paved and several mule-tracks became carriage routes. In addition, new bridges were built, predominantly out of wood, as well as warehouses and other buildings. Much of this infrastructure then remained in use for many years after the end of the war. In addition to soldiers of the Corps of Engineers and prisoners of war, the local inhabitants themselves frequently worked in the building sites that were set up for the construction of these infrastructures, allured by wages that were by no means low.

At this point, one might be misled into thinking that after the First World War, the Lagorai had finally ceased to be a theatre of war. This is not true, as even during the Second World War, the isolated and impervious mountains of the Lagorai became the hiding spots for local battalions of partisans who fought heroically against the Italian Social Republic and the occupying forces of Nazi Germany. There were various episodes of guerrilla warfare, which sadly were often followed by ruthless retaliation by the Germans and the troops of the *Trientiner Sicherungsverband*, or *Corpo di Sicurezza Trentino (CST)*<sup>83</sup>.

Many heroes of the Resistance lost their lives in the villages and forests of the Lagorai, either while battling or because they got executed by firing squads. These martyrs included a number of valiant female combatants who were later awarded the Italian

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<sup>83</sup> [Translated] "Trentino Security Corps".

Resistance gold medal for their courage and loyalty to the values of freedom and justice (de Battaglia, 1989).

It may be said, however, that from a strictly environmental point of view, the Second World War thankfully left almost no traces and visible damage on the Lagorai mountains.

At the end of the conflict, however, the whole Trentino region was in very bad shape: just like the rest of Italy, it was a land that had been destroyed morally and materially; everything needed to be rebuilt, the economy restarted, and the institutions completely reorganised in order to get rid of any fascist infiltration. In the Lagorai, the resumption of traditional economic activities was slow, and even during the economic boom there were no particular investments, least of all in the tourism and hospitality sectors. However, this was the true fortune of the Lagorai: regarded as a marginal, poorly served and 'minor' mountain in comparison to the neighbouring Dolomites, the Lagorai was never overexploited, and for this reason it has maintained a high degree of environmental, landscape and cultural integrity until today.

The historical traces of previous eras, from the ancient *malghe* and *baite* (both of which are mountain huts) to the fortifications of World War I, in a certain way do not undermine the integrity of the Lagorai at all, but rather blend in harmoniously with its landscapes, providing these mountains with very valuable and unique historical memories. After all, most military structures were usually made of local stone, trenches were hidden in the rock and they are now partially filled in by sediment, and damp tunnels are now used by animals to nest or find a den.

In light of all that has been said so far, the rich historical past of the Lagorai does not at all preclude the possibility to establish new and more effective measures of environmental protection. On the contrary, the future valorisation of the Lagorai cannot be achieved without considering the rich history of its territory. Indeed, it is impossible to think in terms of enhancing the beauty and integrity of these mountains if we do not also take into account all the historical human traces that certainly represent an invaluable asset.



Figure 21: Stone steps carved into the rock by soldiers during World War I. Some of the man-made traces left behind by humans in the Lagorai are well blended into the surrounding landscape, resulting in very evocative sceneries.<sup>84</sup>



Figure 22: A World War I stone trench protrudes on a ridge in the Lagorai. In the background, several dolomite peaks are visible.<sup>84</sup>

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<sup>84</sup> Photograph by Alessandro Ghezzer, 2013 - [www.fotoagh.it](http://www.fotoagh.it)

## 2.3 Human traces in an alpine environment: the mountain huts and pasturelands of the Lagorai

The Lagorai - Rava - Cima d'Asta area is characterised by the presence of a large number of traditional buildings which were originally used by shepherds to tend their flocks and guard their pastures at high altitudes. It has been estimated that there are around 280 *malghe* (shepherd's huts) throughout the Lagorai mountain range, as well as bivouacs, shelters, huts, and a few mountain refuges.

The *malghe* of the Lagorai were once used exclusively for agricultural and zootechnical activities; today, however, only a small percentage of these structures are still serving their original purpose. The majority of the remaining buildings have undergone a change of use: a small number have been converted into bivouacs or refuges, while a large number of them are no longer in use and therefore lie in a state of partial or total neglect.

With the rapid abandonment of the *malghe* and pastures by the young generations of pastors, who are no longer attracted by the prospect of an economically unprofitable pastoral life that has been unjustly stigmatised by some, a great heritage of mountain culture and traditions is unfortunately also disappearing. For this reason, if any measure is to be proposed for the enhancement and protection of a section or of the entire Lagorai mountain range, it is essential to also envisage the recovery of many of these derelict *malghe*, which must be brought back into use, provided they comply with local traditions and the fundamental requirements of environmental protection.

The *malghe* are also important for the Lagorai because they serve as a support point for shepherds and herders who manage the high mountain pastures. These pastures are an indispensable public asset for the communities living in the mountains and they also provide an added value in terms of the landscape, as they interrupt “the monotony of the [...] fir woods, of the imposed and negative monospecificity of the [...] forests”<sup>85</sup> (Sezioni WWF Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1990).

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<sup>85</sup> [Original quotation] “la monotonia delle [...] abetaie, della imposta e negativa monospecificità dei [...] boschi” (Sezioni WWF Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1990)..

Mountain pastures, when managed well and in a balanced manner, enable sustainable practices of traditional livestock rearing, and are also a remarkable source of support for various mammal, bird, reptile, and amphibian wild species. With regard to the Lagorai, therefore, we may say that the large meadows established in the past for pastoral use are now positively integrated within the local natural landscape. In addition to providing nourishment for animals, in fact, pastures also offer several benefits to the mountain environment. Thanks to the reduced impact of herbaceous plants on soil composition, grasslands can partially compensate for the excessive acidity induced in the soil by coniferous forests, which are often monocultural because they have been artificially planted after to compensate the damages related to the First World War or to timber harvesting. Furthermore, grasslands can act as a barrier to interrupt or slow down wildfires as well as parasite attacks on the forest.

But the *malghe* of the Lagorai are not all of the same design. It is probable that the first hut-like buildings were erected during the Middle Ages. More specifically, the construction of the earliest buildings was instrumental to the surveillance of grazing flocks of sheep and goats, rather than cattle. The breeding of sheep and goats, as a matter of fact, allowed for an improved utilisation of those pastures located on steep and barren slopes. Furthermore, these animals did not exert the same level of soil erosion as cows, but on the contrary facilitated the natural fertilisation of land and hence the growth of herbaceous plants useful for the proliferation of birds of the tetraonidae family (de Battaglia, 1989). According to some estimates, between the late Middle Ages and the year 1600, there were an astonishing 40,000 to 50,000 head of sheep and goats in the Tesino mountains alone, in the eastern part of the Lagorai.

The first dwellings erected by the shepherds served as a temporary residence and were used almost exclusively during the warm months of the year. They were made of wood, according to the timber-construction technique known as *Blockbau*. This is a very old building technique, which originated in prehistoric times but is still widely used throughout the Alps and in several mountain regions around the world. It involves the systematic stacking of tree trunks, which are neatly carved and wedged at the corners of the building, in between the walls. The roof of the first *malghe*, on the other hand, was built with shingles, i.e. the traditional wooden flat boards made of larch, fir or chestnut wood which were juxtaposed in rows, in order to facilitate the run-off of

rainwater and snow.



Figure 23: Malga Viosa Alta, located in Val Viosa (Eastern Lagorai). This *malga* is at least some decades old and was built according to the traditional blockbau technique. This spartan hut now serves as a bivouac for the few hikers who venture into the Viosa valley.<sup>86</sup>

As time passed, more solid structures were also built. These were made of local stone and also equipped with a wooden roofing, which was often held in place with a few heavy stones and cross logs placed over the roof. The introduction of stone in the construction of alpine shelters led to the “archetype of what can be consider the first malga: the *casélo di monte*”<sup>87</sup> (de Battaglia, 1989).

Next to the malghe, other buildings of similar or smaller dimensions were often built to shelter livestock during the night and to manufacture cheese. An example of this type of structure is the *barco*, a peculiar kind of cattle shed situated inside the main building

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<sup>86</sup> Photograph by Enrico Carraro, October 2023.

<sup>87</sup> [Original quotation] “archetipo di quella che possiamo considerare la prima malga: il *casélo di monte*” (de Battaglia, 1989).

of the malga, but separated from the living spaces by a corridor. The *barco* was often equipped with two openings on the outside, one upstream and one downstream, and its floor was slightly inclined. This made it possible for water from a small stream to constantly flow through the room, so that dung could be removed from the shed and channelled via a network of streams straight into the fields that needed to be fertilised.

Structures known as *maggiolère* were built instead at much lower altitudes. These buildings would be used to hasten the start of the grazing season, as early as April or May. By relying on these footholds at intermediate altitudes, shepherds would take their cattle out to graze at mid-altitude as early as the first thaw, and would then wait for good weather before driving the animals further up into the mountains.

As we have already mentioned, unfortunately today a significant part of this historical heritage of alpine huts located in the Lagorai is in a state of partial or total disrepair. Some *malghe* are in ruins, others are still intact but not maintained because they are located in grazing areas which are now overgrown, while others are not properly looked after because they are part of pastures managed by seasonal employees working for rich cattle breeders from other regions, who have no interest in managing these grasslands just as well as a local shepherd would do.

Therefore, in order to enhance and protect the integrity of the Lagorai territory and its traditions in the future, it is imperative to rethink the secular relevance of the *malghe* and of mountain animal husbandry activities, since they are both fundamental for the preservation of local history, traditions, culture and, last but not least, of the right balance between the activities of valley communities and the conservation of the surrounding natural environment.

In order to plan interventions in this sector it is first necessary to identify “individual *malghe* or homogenous areas of high productive potential, on which to focus the attention and direct the necessary [economic] incentives”<sup>88</sup> (WWF Sections Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1990). It is advisable to accurately target the investments that may be allocated, directing them towards certain buildings or

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<sup>88</sup> [Original quotation] “singole malghe o aree omogenee ad alto valore produttivo, sulle quali accentrare l’attenzione e dirigere i necessari incentivi [economici]” (Sezioni WWF Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1990).

areas that have a higher utilisation potential. Indeed, if we were to immediately restore the entire complex of the Lagorai *malghe* we would risk squandering resources and pouring funds towards the restoration of huts and pastures that are already too neglected or have no prospect of effective use. It is thus advisable to identify only those sites that can still be restored, where the pastures are still recoverable, and whose geographical location is such as to allow for efficient and sustainable forms of animal husbandry.

Furthermore, any investments must not be targeted at the over-modernisation of the buildings or the opening of new forest roads leading to them, but rather at the compensation of any costs and inconveniences inherent in mountain pastoral farming, an activity that most certainly requires a greater continuous outlay and commitment than modern intensive animal farming.

More specifically, pre-existing trails leading to the pastures must be maintained and secured where necessary. Any reclamation and reinstatement of partially overgrown or ruined pastures must be carried out with special emphasis on sustainability, in order to avoid ill-conceived redevelopment works causing more harm than good. For example, reclamation work is not recommended for pastures that have been abandoned for too long and are therefore largely reforested. This is to avoid damaging areas that have already regained a good level of environmental integrity. In the event of land reclamation, moreover, manual intervention is preferable to the use of heavy machinery, given the environmental and landscape impact that earthworks, terracing, drastic logging and land levelling can cause. The use of chemicals or herbicides to fertilise and maintain pastures is also unacceptable. This kind of activity is not only poisonous for the soil and for groundwater, but may also have serious repercussions on the health and diversity of the local flora and fauna.

With regard to the renovation of the existing buildings, traditional construction techniques and materials should be used, so as to preserve the typical exterior features of the *malghe*, whilst readapting the interior to the modern comfort, safety, and hygiene standards.

Lastly, for some *malghe* that are suitable for requalification but have a limited potential for animal husbandry, a possible change of use from *malga* to a bivouac or shelter

could be envisaged. However, the establishment of a large number of bivouacs, especially if these are modern and do not blend in with the architectural features of the traditional huts of the Lagorai, should be ruled out. As a matter of fact, the creation of a dense network of bivouacs and refuges along a mountain range bears the risk for an undue increase in anthropic pressure on the local natural environment.

### 3. THE NATURE AND ENVIRONMENT OF THE LAGORAI

The relative environmental and landscape integrity of the Lagorai is certainly one of the elements that distinguishes this mountain range, making it appreciated and loved not only by environmentalists and conservationists, but also by all those - tourists included - who seek a relatively unspoilt landscape, free of ski facilities, overly dense human settlements, and other kinds of infrastructure.

As we have already seen, the excellent state of health enjoyed by some of the habitats and ecosystems of the Lagorai is partially attributable to the rather marginal role they have played in the past in the economic development of the valleys that intersect the mountain chain.

With the exception of the Fiemme Valley, where extensive use has always been made of woodland, pastures and other ecosystem services offered by the mountains, occasionally to the extent of the total deforestation of entire woodlands (despite the centuries-old self-management practices of the *Magnifica Comunità di Fiemme*), in other areas of the Lagorai the sparser human presence combined with more moderate exploitation of resources has in fact allowed the ecosystems to maintain a considerable degree of integrity, especially at high altitudes and in the far-flung tributary valleys. For this reason, the Lagorai range is effectively one of the largest, if not the largest area of high naturalistic value within the Autonomous Province of Trento, inasmuch as it is “nationally renowned as one of the largest areas of wilderness in the entire [Italian] peninsula”<sup>89</sup> (Pavan, 1983, as cited in Caldonazzi et al., 1990, p. 4).

When it comes to the natural landscape characteristics of the Lagorai, one of the factors that probably influences them the most is the climate. In fact, the entire mountain chain has an alpine climate, which, however, presents milder traits in the southern part of the mountain range, due both to its greater proximity to the Pre-Alps and the Po Valley, and to the lower altitude of the Valsugana valley floor compared to that of the Valle di Fiemme.

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<sup>89</sup> [Original quotation] “nota a livello nazionale come una tra le maggiori aree di wilderness dell’intera penisola” (Pavan, 1983, as cited in Caldonazzi et al., 1990, p. 4).

From a climatological point of view, the Lagorai is in fact located in an area of transition and has a rather sharp climatic gradient within it. It lies at the southern limit of the central-alpine belt where there is a continental climate; from the south to the north of the mountain range there is therefore a transition from a pre-alpine climate to a distinctly continental one. This peculiarity “is amplified by the shielding effect of this mountain range, arranged approximately along the North-East/South-West direction, against the humid currents coming from the south. The different exposure of the slopes also contributes to different vegetation situations”<sup>90</sup> (Sottovia, 2009).

As evidence of this, please consider the map in Figure 24, called *Le aree forestali del Trentino in funzione del gradiente climatico e geografico*<sup>91</sup> and published in the study *I tipi forestali del Trentino*<sup>92</sup> edited by the Autonomous Province of Trento in 2018.

Trentino hosts two main types of forest areas, which can be differentiated according to the climatic and geographic gradient: alpine or endalpic areas<sup>93</sup>, and areas with a pre-alpine character, “in turn distinguishable in a mesalpic/mesothermal area (mostly mountainous) [...] and an esalpic/macrotthermal area (mostly hilly)”<sup>94</sup> (Provincia Autonoma di Trento - Servizio Foreste e Fauna, 2018).

As can be observed from Figure 24, in eastern Trentino the Lagorai (including the Cima d'Asta and Rava groups and subgroups) constitutes the only mountainous area with a predominantly endalpic climate, i.e. an alpine climate.

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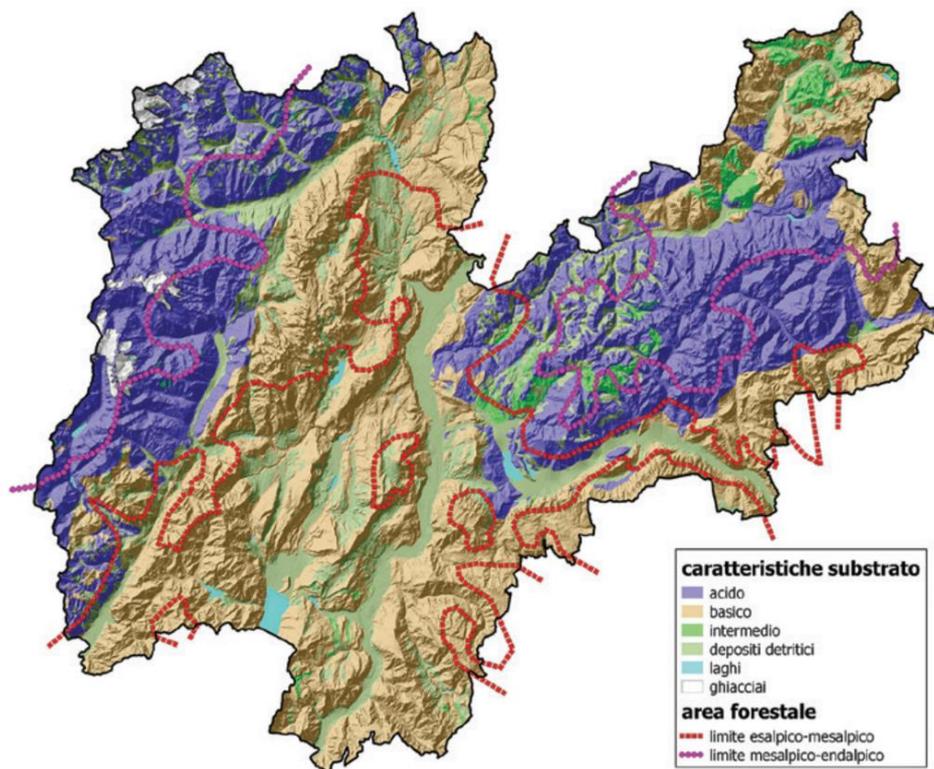
<sup>90</sup> [Original quotation] “è amplificata dall'effetto schermante di questa catena montuosa, disposta approssimativamente lungo la direzione Nord-Est/Sud-Ovest, nei confronti delle correnti umide provenienti da meridione. Anche la diversa esposizione dei versanti contribuisce a determinare diverse situazioni vegetazionali” (Sottovia, 2009).

<sup>91</sup> [Translated] *Trentino's forest areas as a function of the climatic and geographical gradient.*

<sup>92</sup> [Translated] *Forest types in Trentino.*

<sup>93</sup> [Original] zone/aree endalpiche.

<sup>94</sup> [Original quotation] “a loro volta distinguibili in un'area mesalpica/mesoterma (perlopiù montana) [...] e una esalpica/macrotterma (perlopiù collinare)” (Provincia Autonoma di Trento - Servizio Foreste e Fauna, 2018).



Le aree forestali del Trentino in funzione del gradiente climatico e geografico

Figure 24: Cartographic representation [translated title] "The forested areas in Trentino according to the environmental/climate gradient and the geographical gradient"<sup>95,96</sup>

It is no coincidence that “the endalpic zones include the higher mountain massifs (Dolomites, Lagorai, Adamello, Cevedale) and the enclosed valleys, typically with an east-west orientation [...]; these are environments with a harsh, continental climate, particularly favourable to forest habitats dominated by boreal conifers such as spruce, larch or stone pine”<sup>97</sup> (Provincia Autonoma di Trento - Servizio Foreste e Fauna, 2018). The map shows that the esalpic-mesalpic boundary is generally located in the south, along the northern slopes of the Valsugana Valley, while the mesalpic-entalpic boundary is instead a little further north, in correspondence with the first range of ridges with considerable altitude.

<sup>95</sup> [Original title] “Le aree forestali del Trentino in funzione del gradiente climatico e geografico”.

<sup>96</sup> Image from Provincia Autonoma di Trento – Servizio Foreste e Fauna, 2018.

<sup>97</sup> [Original quotation] “le zone endalpiche comprendono i massicci montuosi con maggior elevazione (Dolomiti, Lagorai, Adamello, Cevedale) e le vallate intercluse, tipicamente con orientamento est-ovest [...]; si tratta di ambienti a clima rigido e continentale, particolarmente favorevoli a consorzi forestali dominati da conifere boreali come abete rosso, larice o pino cembro” (Provincia Autonoma di Trento - Servizio Foreste e Fauna, 2018).

### 3.1 Flora

As we have just seen, the Lagorai is characterised by an alpine climate. However, it is important to note that it also has four main altitudinal levels: hilly, mountainous, subalpine, and alpine (Pedrotti, 2013). The vegetation, of course, is distributed differently at different elevations.

The foothill zone, i.e. the least elevated level of the Lagorai, lies between the valley floor and about 800 m above sea level. It is mainly characterised by moist and fertile soils, which support the growth of dense forests primarily composed of broad-leaved trees (ash, black hornbeam, white hornbeam, etc.), i.e. rather thermophilic plants. Extensive woods of black hornbeam and manna ash (a type of ash typical of Southern Europe and Southwestern Asia - *Fraxinus ornus*) mainly grow in the Cembra Valley and in some areas of the Fiemme Valley, especially in its lowest part. Unfortunately, on the valley floor and along the mountain slopes, human activity in the past has often led to deforestation, mainly to acquire new land for agricultural, residential, and industrial use (WWF - Delegazione del Trentino, 1993).

The montane zone, on the other hand, stretches between 800 and 1,300 m above sea level and is characterised by plants that can better withstand cold temperatures, such as broad-leaved trees (beech, birch, sorb tree, and chestnut, but also grey alder and willow) and needle-leaved trees (Scots pine, European silver fir, Norway spruce, and others). Beech is mainly indigenous to the southern side of the Lagorai - Valsugana, Mòcheni Valley, Calamento Valley, and Campelle Valley - and to the eastern side – Malene Valley, Vanoi Valley, Primiero Valley (La Vegetazione, last consulted in November 2023).

It is worth mentioning that the European silver fir forests of the Vanoi and Campelle valleys are of considerable naturalistic value since the occurrence of this type of tree is unfortunately declining throughout the Alps.

The subalpine zone, on the other hand, lies between 1400/1500 m above sea level and approximately 2000/2200 m above sea level. This is an area with a much harsher climate during the winter period, and for this reason it is almost exclusively populated by coniferous trees. At various elevations, both larch and Norway spruce grow; the

latter, however, thins out as it rises in altitude, and leaves room for extensive larch woods, which populate entire slopes (also on exposed and nutrient-poor terrain) as they are a hardy, pioneer species. At the highest altitudes of the subalpine zone, i.e. above 1700 m.s.l., the stone pine grows as well as the semishrubby plants of the so-called “alpine scrub”<sup>98</sup>, i.e. the dwarf juniper and sometimes the mountain pine. Various rather small plants are also present, such as the rhododendron, blueberry, bearberry, and green alder (WWF - Delegazione del Trentino, 1993).

At an even higher altitudinal level is the alpine zone. This higher altitudinal zone is characterised by the presence of extensive screes, areas with low vegetation and discontinuous clumps of earth and grass, and extensive grasslands on which no tall plants grow, but fescues and curvulets instead. On south-facing slopes, abundant tufts of *Festuca pseudovaria* often sprout, giving the inclined meadows a terraced appearance. There are also some grass species and, in the high-altitude pastures, the small, resilient Cyperaceae grass *Carex curvula*. Due to the absence of trees and the harsh climate, this biome is also referred to as “alpine tundra” (La Vegetazione, last consulted in November 2023).



Figure 25: The transition between the sub-alpine and alpine vegetation belts, seen from the southern slopes of Monte Cauriol at an altitude of 2100 m.s.l. The last tall needle trees and alpine scrub plants give way to tufts of *Festula pseudovaria*. In the background stand the peaks of Castel Aie, Formentone, and Il Frate.<sup>99</sup>

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<sup>98</sup> [Original] boscaglia alpina.

<sup>99</sup> Photograph by Enrico Carraro, July 2022.

A very unique environment for vegetation is indeed that of peat bogs, which are relatively common in the Lagorai due to the presence of a great number of lakes and streams. As already mentioned, they can be found both in glacial depressions and in former glacial cirque lakes that have now been exhausted by the accumulation of sediments and debris.

It is worth remembering that bogs can be of three types: fens/minerotrophic bogs, intermediate or transitional bogs, and raised bogs/ombrotrophic bogs. This distinction results in vastly dissimilar living conditions for vegetation and fauna (Pedrotti, 1989).

Fens are the most common type of bogs and are made up of partially flooded soil with more or variable depth water accumulation, on which low grasses grow. In the Lagorai mountain range, fens are found on small plateaus, saddles, fluvial-glacial terraces and on the banks of alpine lakes. The water supply of these fens comes from the soil and therefore it contains a considerable number of mineral salts and nutrients, and the soil is not very acidic; this facilitates the proliferation of a rather varied vegetation.

Fens can sometimes evolve over thousands of years into raised bogs, passing through a state known as *transition*. Transitional peat bogs have intermediate characteristics compared to the other two types and, in the Lagorai, they are mainly found in glacial cirque lakes that are now dried up, or in glacial basins.

Lastly, raised bogs differ from the others in their morphology, water balance, soil chemical characteristics and vegetation. The constant presence of water below the surface causes large accumulations of sphagnum mosses (peat mosses) to form. These are alive on the surface and dead, but un-decomposed, in the lower flooded layers. The undecomposed sphagnum remains cannot act as nutrients for the living mosses on the surface, with the latter only being able to absorb water and nutrients from the rain. This results in a poor and much more acidic environment, compared to that of fens and intermediate bogs (Provincia Autonoma di Trento, 2023).

Lastly, when speaking of the vegetation of the Lagorai, it is also appropriate to mention the many flowers that grow in abundance throughout the mountain range. These include anemone, gentian, houseleek, daphne, snowbell, saxifrage, campanula, buttercup, aconite or monkshood, catchfly, rock jasmine, rhododendron, and so forth.

Exceptional is the presence of the endemic dwarf soapwort (*Saponaria pumila*), which in Trentino can only be found in this area (WWF - Delegazione del Trentino, 1993).

In this section, special mention must also be made of the monumental trees, which are present in large numbers all over the Lagorai range. One such example is the *Re Leone*<sup>100</sup>, a huge stone pine located in Pian dela Fava that has a tree trunk circumference of over 5 metres and an estimated age of over 800 years. Nearby there is also the tree *L'Eterno*<sup>101</sup>, another stone pine which is over a thousand years old, is no longer alive but from whose base another plant has grown. Or the so-called *Maestro degli Avezi*<sup>102</sup>, a gigantic white fir tree, 49 metres high, 4.5 metres in circumference and weighing over 30 tonnes; this white fir is surrounded by a group of fellow trees, some of which are themselves monumental trees (Calamari, 2022; Trentino Tree Agreement, 2023). These trees are not only to be admired and protected for their aesthetic beauty, size, or venerable age, but also and above all because their presence "is the most significant image of the good conservation of the forest and of its perpetuity"<sup>103</sup> (Zorzi, 1991).

## 3.2 Fauna

As stated on the official website of the Paneveggio - Pale di San Martino Nature Park, which also includes the north-eastern end of the Lagorai, the Lagorai mountain range is indeed "an almost inexhaustible reservoir of nature: in the forests, high altitude meadows, screes and rocks that characterise its environments lives a very rich alpine fauna"<sup>104</sup> (Parco Naturale Paneveggio Pale di San Martino, 2023).

The Lagorai is in fact home to a vast array of animal species, some of which of considerable scientific value. The abundance of so many species of wildlife is undoubtedly attributable to the relatively intact environment of the mountain range,

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<sup>100</sup> [Translated] Lion King.

<sup>101</sup> [Translated] The Eternal.

<sup>102</sup> [Translated] The Master of Avezi (name of an area in the Fiemme Valley).

<sup>103</sup> [Original quotation] "è l'immagine più significativa della buona conservazione del bosco e della sua perpetuità" (Zorzi, 1991).

<sup>104</sup> [Original quotation] "un serbatoio di natura pressoché inesauribile: nei boschi, nelle praterie d'alta quota, nei ghiaioni e nelle rocce che caratterizzano i suoi ambienti vive una ricchissima fauna alpina" (Parco Naturale Paneveggio Pale di San Martino, 2023).

which still displays rather pristine and isolated environments, where hunting is not practised to the same extent as in other parts of Trentino and anthropization is rather reduced. Gino Tomasi, in his talk at the 13 April 1986 conference *Lagorai, fra amore antico e necessità di vita*<sup>105</sup>, rightfully remembered that the fauna, just "like the plant *biocoenosis*, finds here a quantitatively rich, isolated, protected habitat, and such that its components can reach their maximum numerical density"<sup>106</sup> (Tomasi (Ed.), 1986, as cited in de Battaglia, 1989, p. 80).

First of all, it should be emphasised that several large herbivorous mammals can be found in the Lagorai, such as roe deer (from the valley floor up to about 2000 m.s.l.), chamois, ibex (in rocky areas with grasslands between 1600 and 2800 m.s.l. in winter and above 2300 m.s.l. in summer), and red deer. The latter, in particular, are the outcome of a highly successful reintroduction project initiated by local forest manager Donato Nardin in 1955-1956 in the Paneveggio state forest, where an enclosure was created to house three deer (two females and one stag). In the following decades, the reintroduced deer were able to gradually reclaim the territories from which they had disappeared due to excessive hunting activity directed against them: not only the Travignolo basin, but also the Lagorai and the areas to the south and north of the mountain range (Nardin, 1994).

Moreover, in recent years wild boar have unfortunately appeared and proliferated in some low-altitude areas of the Lagorai, such as the Cadino Valley or the slopes of the Valsugana Valley. Being a highly invasive species, wild boar creates damage to the undergrowth and threatens the existence and possibility of grazing of other animals.

On the other hand, with regard to large carnivores, the Lagorai is home to a significant number of wolves. This species had completely disappeared from Trentino during the second half of the 19th century, as a consequence of anthropic pressure and excessive hunting, which was often driven by unmotivated fears, folklore false beliefs and even official bounties set for the culling of as many wolves as possible.

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<sup>105</sup> [Translated title] "Lagorai, between ancient affection and the necessities of life".

<sup>106</sup> [Original quotation] "al pari della biocenosi vegetale, trova qui un habitat quantitativamente ricco, isolato, protetto, e tale da portare i loro component alla loro massima densità numerica" (Tomasi (Ed.), 1986, as cited in de Battaglia, 1989, p. 80).

Since the 1980s and 1990s, however, the wolf has fortunately made its reappearance in the Alps, coming both from the Apennine ridge and from more distant areas, such as the Dinaric Alps and the Carpathians (Servizio Faunistico - Provincia Autonoma di Trento, 2022). Today, there are numerous wolf packs in Trentino, with an estimated minimum population size of about 29 packs (Angeli et al., 2023). Several of these packs populate the Lagorai quite permanently (Figure 26), since this territory is particularly favourable to wolves thanks to its limited anthropization, the abundance of ungulates and other prey species and, last but not least, the presence of herds in the alpine pastures.

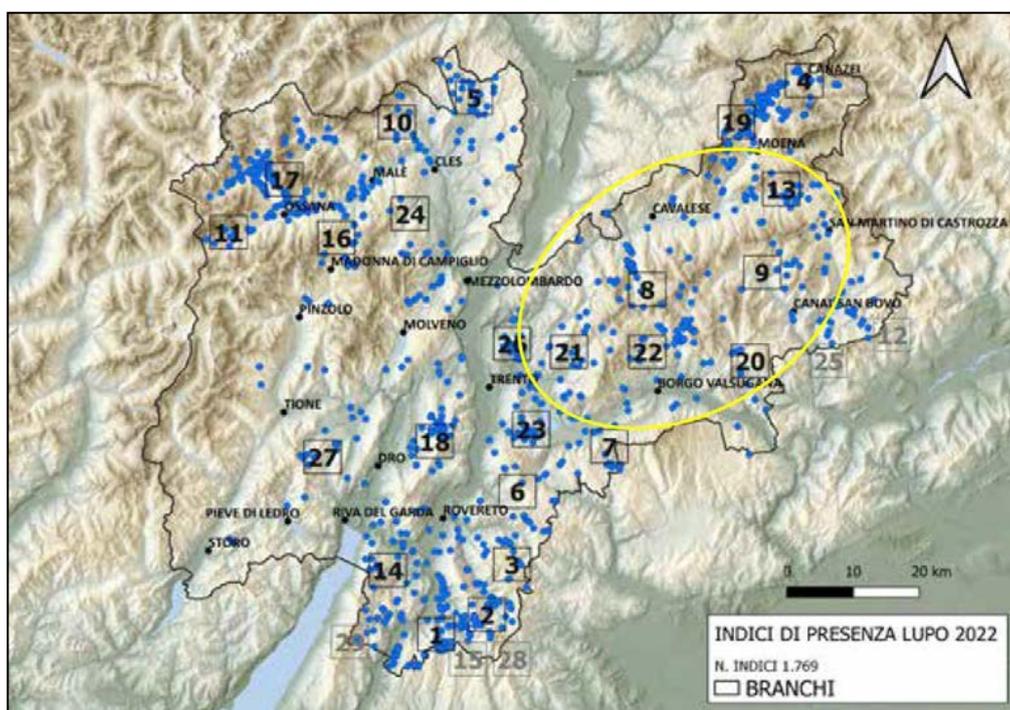


Figure 26: Map *Wolf presence indices 2022*<sup>107</sup>, taken from the *Rapporto Grandi Carnivori 2022* (2023) edited by the Settore Grandi Carnivori of the Servizio Faunistico of the Autonomous Province of Trento. As can be clearly observed from the map, the Lagorai mountain range (marked by us in yellow) is populated by several packs of wolves (see boxes), more than anywhere else in Trentino.

Another large carnivore that can be seen in the Lagorai, albeit in much smaller numbers, is the golden jackal. The presence of some packs of this animal in Trentino has recently been confirmed, and one of the two confirmed breeding sites on the territory of the Autonomous Province of Trento (Angeli et al., 2023) is located precisely on the slopes of the Lagorai, near the village of Cavalese in the Fiemme Valley.

<sup>107</sup> [Original title] “Indici di presenza lupo 2022”. Map from Angeli et al., 2023.

On the other hand, according to the most up-to-date monitoring, brown bears do not seem to have a permanent residence in the Lagorai. As a matter of fact, while the mountain range is listed as part of the maximum distribution area potentially visited by bears in 2022, it is located far away from the main reproduction and residence zone of female bears, which is instead limited to western Trentino (Angeli et al., 2023). It must be considered, in this regard, that both the Adige River and the A22 - Brennero Highway divide Western Trentino from Eastern Trentino and in fact represent a practically insurmountable ecological barrier for bears (as well as for many other species).

As regards the Eurasian lynx, there is currently insufficient evidence to believe that it is still resident in the Lagorai area, or even in Trentino. Indeed, the presence and constant reproduction of this animal in the Lagorai had been recorded in the 1980s (Ragni, 1998), so much so that the WWF had emphasised this factor in order to give further naturalistic relevance to the proposal for a Natural Park in the Lagorai-Rava-Cima d'Asta area. According to the most recent records, the only remaining lynx specimen in Trentino (a male named B132) is to be found today in western Trentino, in the Corda - Stigolo locality near Ledro. The total absence of sightings and tracks after spring 2022, however, suggests that unfortunately the last lynx individual in Trentino may be dead. The very recent and well managed "UE LIFE Lynx" project for the reintroduction in spring 2023 of five lynx in the Tarvisio Forest (in the Province of Udine), however, bodes well for the possible reappearance of the lynx in Trentino and therefore also in the Lagorai (Raggruppamento Carabinieri Biodiversità et al., 2023; WWF, 2023).

Of course, the Lagorai is also populated by smaller species, such as European pine martens, beech martens, ermines, foxes, marmots, badgers, hedgehogs, shrews (several species), dormice, squirrels, moles, voles, hazel dormice, and finally European hares and mountain hares (the latter being more frequent at higher elevations).

The avifauna of the Lagorai is also extremely diverse, and this is one of the reasons why several Special Protection Areas (SPAs) have been established in the Lagorai, in accordance with the Birds Directive 2009/147/EC. Specifically, there is an abundance of birds of the Phasianidae family belonging to the order of the galliformes. More

specifically, they are subdivided into two subfamilies: Tetraonidae such as the black grouse or Eurasian black grouse, the western capercaillie, the hazel grouse, and the rock ptarmigan; and a member of the Perdicinae subfamily, the common rock partridge (*Alectoris graeca*). Each of these species has its own ideal habitat, both in terms of altitude and nesting sites.

The Lagorai is also home to numerous species of raptors, both diurnal and nocturnal. Diurnal ones include the golden eagle (a nesting species), lammergeyer (an occasional visitor), Eurasian goshawk (a nesting and sedentary species), Eurasian sparrowhawk (a nesting species in coniferous forests), European honey buzzard (a migratory but nesting species) and kestrel (a nesting species on rock walls). Among the nocturnal birds, mention should be made of the Eurasian eagle owl, tawny owl, Eurasian pygmy owl, and boreal owl.

There are also many woodpecker species: the black woodpecker, great spotted woodpecker, grey-headed woodpecker, Eurasian nuthatch, and European green woodpecker. Also remarkable is the presence of the Eurasian three-toed woodpecker, which is very rare in Italy.

Also not to be forgotten are the common raven, Alpine chough or yellow-billed chough, thrush, Eurasian nutcracker, the birds of the Paridae family, the Eurasian chaffinch, white-throated dipper, common crossbill, Eurasian treecreeper, common swift, Eurasian crag martin, barn swallow, western house martin, tree pipit, water pipit, grey wagtail and white wagtail, dunnock, common cuckoo, whinchat, ring ouzel, European robin, common redstart and black redstart, common linnet, European greenfinch, song thrush, mistle thrush, common chiffchaff, Eurasian bullfinch, lesser whitethroat, red-backed shrike, Eurasian jay, fieldfare, brambling, Eurasian siskin, Eurasian blackcap, common firecrest, spotted flycatcher, marsh tit, and Italian sparrow. In addition, there are various other minor species that were here omitted.

On the other hand, the numerous wetlands and humid areas of the Lagorai are mainly populated by amphibian species: the European common frog, agile frog, common toad or European toad, fire salamander, alpine or black salamander, yellow-bellied toad, and alpine newt (WWF - Delegazione del Trentino, 1993).

There are also numerous species of reptiles. Among the Sauria species are the western green lizard, slow worm, viviparous lizard or common lizard, and the common wall lizard; among the snakes we should mention the smooth snake and the Aesculapian snake, dice snake, grass snake or ringed snake, common European viper or common European adder, and finally the European asp or aspic viper.

The Lagorai is also home to a large variety of invertebrate species, and their abundance is often considered as an indicator of environments and “forests with a high degree of naturalness”<sup>108</sup> (Provincia Autonoma di Trento, 2007).

Unfortunately, over the last couple of years, one particular insect has caught the spotlight due to its uncontrolled spread and the extensive damage it has caused to forests, and thus also to the timber processing industry. We are referring to the European spruce bark beetle (*Ips typographus*), a small beetle that is normally present in alpine environments and which, under natural conditions, performs a useful task of forest clearing, by feeding on the weakest European spruce trees.

In recent years, however, the uncontrolled proliferation of the European spruce bark beetle has led to the almost total destruction of entire European spruce forests. The uncontrolled spread of the European spruce bark beetle is a consequence of both climate change, which has increased the beetle's reproductive capacity, and of human action on the woodlands, which for centuries has favoured the proliferation of the spruce trees that the parasite feeds on. In addition, the Vaia storm of autumn 2018 toppled millions of trees, many of which have been left to rot in the woods, thereby becoming an additional food source for the parasites. As of now, the survival of a large number of spruce trees in the Lagorai is severely jeopardised by the uncontrolled proliferation of the European spruce bark beetle.

Finally, the ichthyofauna of the Lagorai is also of naturalistic interest. The prevailing species, both in the streams and in the small lakes at medium and high elevations, are those belonging to the Salmonidae family. The river brown trout and marble trout are most common in streams, while the Arctic char is the undisputed dominant species in high altitude mountain lakes and reservoirs. The European bullhead and the European

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<sup>108</sup> [Original quotation] “boschi con elevato grado di naturalità” (Provincia Autonoma di Trento, 2007).

minnow are also two notable fish species (Caldonazzi et al., 1990). The continued existence and equilibrium between all these species, however, has been threatened in the past by the introduction of alien species, such as the rainbow trout (which leads to dangerous cases of cross-breeding) and the brook trout (native to North America).

The otter deserves special mention here. In the past, this species was widespread throughout the entire Lagorai, both in the smaller streams and in the torrents at the bottom of the main valleys. In the modern day, however, the otter has gone extinct across the whole mountain range. Investigations were organised in the 1990s to determine whether a small population of indigenous otters might have survived in the lower Avisio torrent, but sadly they produced negative results. The last sightings of otters date back to the 1960s for the Vanoi area and to the 1970s for the Cadino Valley. The extinction of this species throughout the Lagorai seems to have been caused almost exclusively by humans, who have hunted otters intensively and also disrupted their habitats by weiring, reducing river flows, and polluting their waters.

The memory of the otter and of its significance for the local environment, however, is still alive not only in the books but also in local traditions. For instance, various heraldic arms of the Primiero municipalities bear the image of an otter (WWF - Delegazione del Trentino, 1993).



Figure 27: The heraldic arms of the Imer Municipality (on the left) and of Primiero Community (Comunità di Primiero). In the centre of the coat of arms is the otter, which apparently continues to hold a very strong symbolic meaning for local people.<sup>109</sup>

<sup>109</sup> Images retrieved from Wikipedia.

The otter is also evoked in several folk legends, at times in a positive way and occasionally in a negative one. One story, for example, attributes “the origin of the Primiero valley in San Martino, where the Lagorai ends, to a large lake which was drained because of the otters, who had gnawed its banks with their teeth. A profanation that triggered in retaliation the extermination of this species, which is another recurring element of the legends that are still told in these valleys”<sup>110</sup> (Orlando, 2015).

Another legend, however, portrays the otters in a totally positive sense. In fact, the tale goes that once upon a time the Primiero Valley was completely submerged by water, enclosed as it was between the massifs of the Pale di San Martino and the Feltrine Peaks. A solitary otter lived in this vast lake and, since he wanted companionship, he made a passage through the rocks that prevented him from leaving. Having opened a gap, all the water flowed further downstream and this phenomenon produced the Schenèr gorge, and also freed the Primiero valley from all the floodwaters. It was therefore largely with the help of this otter that people succeeded in settling in the valley and colonising it. In honour of the otter, therefore, men elected it as the heraldic symbol of their valley (Val di Primiero - Vanoi, 2023).

Even though the otter has now become extinct, the level of environmental integrity of some areas of the Lagorai could perhaps provide an opportunity to reintroduce the species, as has already been done for other animals in Trentino. This would obviously require an accurate analysis of the effective feasibility and capacity of the ecosystems to support and bear the re-entry of otters into local ecosystems. A spontaneous return of the species, as with the beaver in other areas of the Alpine arc, would in fact be rather unlikely, given that the group of otters closest to the Lagorai is located quite far away, in north-eastern Alto Adige.

Finally, in this exposition on the wildlife of the Lagorai we should at least mention that several domesticated species can also be found within the mountain range. First and foremost, cattle and sheep, which get moved to the mountain pastures and meadows

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<sup>110</sup> [Original quotation] “l’origine della valle del Primiero, a San Martino, dove finisce il Lagorai, a un grande lago svuotato a causa delle lontre, che con i loro denti ne avevano eroso le sponde. Una profanazione che scatenò per rappresaglia lo sterminio di questa specie, altro elemento ricorrente dei racconti che si conservano in queste valli” (Orlando, 2015).

during the summer months, but also a number of sheep and horse species, alongside domesticated roosters and hens, shepherd dogs and domestic cats.

## **4. PAST AND PRESENT CONSERVATION PLANS FOR THE LAGORAI MOUNTAIN RANGE**

### **4.1 The anthropic pressure and urban speculation in the Lagorai, and the first conservation proposals**

As we have already mentioned, until the first half of the 20th century, the Lagorai Mountains had never been given particular recognition for their naturalistic value. On the contrary, the area had long been regarded as a rather marginal and transitional territory, serving as a simple link between the more imposing Brenta Dolomites and the Pale di San Martino Dolomites, a favourite destination for naturalists and mountaineers since the mid-19th century.

The Lagorai became famous for the first time because of World War I, a terrible conflict that nevertheless resulted in the first systematic survey and recognition of the entire territory of the mountain range. As a matter of fact, the military demands had made it necessary to carefully map the entire Lagorai and acquire accurate knowledge of its geomorphological characteristics. The construction of extensive infrastructures in support of the war effort, moreover, improved the connections between the Lagorai peaks and the valley floor, especially because of new cart roads, mule tracks and trails. In the decades following the First World War, the overwhelming legacy of the war period made it easier for the first tourists and scholars to travel to these mountains and start to appreciate and study them. It is no coincidence that the true naturalistic discovery of the Lagorai started in the 1950s, when a larger number of hikers and mountaineers began to venture into the Lagorai, in search of a more authentic and less-travelled mountain than the nearby Dolomites, which were already experiencing a rather heavy anthropic and tourist pressure by the mid-20th century.

Among the first to explore and document the Lagorai and its valleys during the 1950s were Vittorio Coraiola and Giuseppe Šebesta, who were soon followed by several fellow colleagues and friends, including the naturalist and geologist Ezio Mosna, the mountaineers Giulio Gabrielli and Luciano Eccher, the librarian and mountain enthusiast Ulisse Marzatico, the environmentalist Francesco Borzaga, as well as Paolo

Morelli, Dario Segatta, Carlo Alberto de Battaglia, and several other figures from the local environmental and mountaineering scene of Trentino.

It was not until the 1960s, however, that this fascination for the Lagorai translated into a real proposal for active protection of its territory and natural heritage. In the year 1965, Gino Tomasi, a naturalist from Trentino who had recently been appointed director of the *Museo Tridentino di Scienze Naturali* (Tridentine Museum of Natural Sciences), formulated the first official proposal for a *Parco naturale del Lagorai* (Lagorai Natural Park), which would complement the two other natural parks that had been proposed for the Brenta Dolomites and the area of Paneveggio - Pale di San Martino area.

The idea behind the creation of a park was not only to preserve the nature of the Lagorai, but also to plan urban development at a regional level. It is not without reason that the Lagorai Natural Park was included in the framework of the *Piano Urbanistico Provinciale* (Provincial Urban Plan) that the Autonomous Province of Trento was ready to approve in those same years. The Provincial Urban Plan (PUP) was a novelty in Italy and was ideally based on a far-sighted vision of the future, which had to take into account not only the regional innovation and development agenda, but also the protection of local traditions, identities and landscapes. In the vision of Dr. Gino Tomasi, the Lagorai mountain range had to be protected so as to maintain a wilder and more authentic alternative to the scenic but tourism-ridden beauty of the Dolomites. Gino Tomasi captured the very essence of the mountain range in his 1965 accompanying document to the PUP cartography, where he wrote: "It is an oasis of pristine nature of a kind that is difficult to find in the entire Alpine range. From Passo del Manghen to Passo di Rolle, a succession of peaks spreads out in an uninterrupted sequence about 30 kilometres long, which constitutes the highest porphyritic mountain range in the Alps. In addition to the admirer of the landscape unharmed by human intervention, this mountain range fascinates the geologist due to the coexistence of three very significant rock formations [...], the botanist due to the presence of endemic flowers and forest canopies of European fame, and the zoologist due to the survival of

extremely interesting fauna”<sup>111</sup> (Tomasi, 1965, as cited in Tomasi, 1988, p. 7; Tomasi, 1965, as cited in de Battaglia, 1989, p. 157).

One could argue against this description by pointing out that it is outdated and that there have indeed been human interventions in the Lagorai. This is only partly true: although anthropogenic traces from World War I can be seen almost everywhere on the ridges and peaks of the mountain range, these have now become an almost integral part of the geological landscape of the Lagorai. In a way, they provide a unique historical significance to the area, without bearing any negative impact on the life and diversity of the local flora and fauna, now that more than a century has passed since the end of the war. On the other hand, as far as more recent anthropogenic interventions are concerned (ski facilities, new roads, buildings, tree felling), while it is true that such interventions have taken place and are certainly observable, it must nonetheless be acknowledged that in many internal areas of the Lagorai there is no evidence of them at all. These activities have in fact been limited to the periphery of the vast mountain range. This is why the integrity of the Lagorai has fortunately not yet been impaired by “human interventions”<sup>112</sup>, as Dr. Gino Tomasi called them (Tomasi, 1965, as cited in Tomasi, 1988, p. 7).

It should be said, however, that the park proposal formulated by Gino Tomasi in the 1960s was never officially implemented, and this was not necessarily due to a lack of sensitivity to the issue of nature conservation, but rather to a misconception of the park idea per se. The prevailing mentality immediately after the Italian economic miracle was that a natural park should not only be a system for safeguarding the environment and the natural landscape, but also a powerful catalyst for stimulating touristic growth. It is no coincidence that only two areas in Trentino were designated as parks: the Pale di San Martino with the nearby Paneveggio forest, and the Brenta Dolomites, both of which are extremely scenic and popular. The area adjacent to these parks, as it was

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<sup>111</sup> [Original quotation] “Si tratta di un’oasi di natura intatta quale riesce difficile a reperire in tutto l’arco alpino. Dal Passo del Manghen al Passo di Rolle si snoda una successione di vette per un asse non interrotto di circa 30 chilometri, che costituisce la più elevata catena porfirica di tutte le Alpi. Oltre l’amante del paesaggio esente da manomissioni umane, questo gruppo montuoso interessa il geologo per la coesistenza di tre formazioni di grande importanza [...], il botanico per la presenza di flore endemiche e coperture forestali di rinomanza europea, lo zoologo per la sopravvivenza di fauna di grande interesse” (Tomasi, 1965, as cited in Tomasi, 1988, p. 7; Tomasi, 1965, as cited in de Battaglia, 1989, p. 157).

<sup>112</sup> [Original quotation] “manomissioni umane” (Tomasi, 1965, as cited in Tomasi, 1988, p. 7).

envisaged at the time, was destined to serve as a natural outlet for those tourist and economic activities that could not be carried out within the perimeter of the natural parks. The Lagorai, similarly to many other mountain areas adjacent to parks, was therefore regarded as a free territory of lesser tourist value, which could be exploited without much concern. Evidently, in this kind of vision dominated by economic considerations, the proposal for a natural park in the Lagorai, as put forward by Tomasi, could not find fertile land.

On the contrary, the first Provincial Urban Plan of the Autonomous Province of Trento, issued in 1967, even though it incorporated a limited portion of the north-eastern area of the Lagorai into the Paneveggio - Pale di San Martino Natural Park, also provided for a number of invasive interventions that had all the potential to totally devastate the Lagorai: the widening and annual opening of the Passo Manghen road, the transformation of the Passo di Cinque Croci into a major alpine pass for cars, the razing of the Val Calamento woodlands to make room for ski slopes and lifts on both sides of the valley, and many more (de Battaglia, 1989). In short, the PUP included a whole series of projects that could seriously jeopardise most unique and distinctive characteristics of the Lagorai: the absence of roads penetrating the mountain chain from the numerous lateral valleys, the integrity of numerous internal areas, the absence of car routes cutting across the mountain chain in an east-west and north-south direction (with the exception of the Manghen road, which is only opened in the summer), the scarcity of residential buildings and even huts within the group, and the absence of ski facilities in most areas.

Luckily, several of the most invasive projects were halted thanks to political and social mobilisations by citizens, associations (first and foremost Italia Nostra and WWF), and sometimes even valley communities. However, some damaging interventions on the Lagorai territory were nevertheless carried out: the widening and asphaltting of the Manghen pass road in the early 1970s, the opening of the forest road junction between Val Cia and Vanoi, and the creation of a dense network of other forest roads on various valley slopes both within and outside the mountain range.

To prevent further detrimental interventions in the Lagorai and to promote its conservation, as early as 1976 the WWF came forward with new proposals for the establishment of a nature park. These propositions were then revised and updated

year by year, based on comparisons with similar experiences from other parks in Trentino, in Italy and abroad.

In those same years, several organisations and institutions were active throughout the Province of Trento to organise conferences and debates with the goal of gathering ideas and authoritative opinions on the feasibility and actual need for a nature park in the Lagorai. We would like to mention, for example, the conference *Lagorai: tra amore antico e necessità di vita* (Lagorai: between an ancient love and vital necessities), which took place in Borgo Valsugana on 13 April 1986 and saw the involvement of various academics and naturalists. Another highly significant conference, with the title *Lagorai: Ecologia, Forestazione, Turismo, Occupazione. Identità di un parco* (Lagorai: Ecology, Forestry, Tourism, Employment. Identity of a park), was held in Valsugana, in Vetriolo Terme, on 21 June 1986. This second meeting was also attended by numerous prominent figures connected to the scientific and political scenes of Trentino. The event resulted in a thorough, precise, and exhaustive analysis of the main concerns and perspectives for the environmental protection of the Lagorai territory (Bonazza, 1986; Valcanover, 1986).

The considerations and proposals for a park stemming from these conventions never revealed a desire to create a strictly conservationist park, i.e. one exclusively focused on nature conservation, without any consideration for the local population and its legitimate needs. On the contrary, emphasis was always placed by all the different lecturers on the need to invest in creating a park “not only as an integral reserve, but also as a resource, both environmental and economic, to be used for the promotion and the economic and social development of those communities involved in the park”<sup>113</sup>, as stated by the then Provincial Councillor for Land, Environment and Forestry, Walter Micheli (1986). The purpose was therefore to encourage environmentally sustainable agroforestry and tourism practices, such as “beekeeping, traditional mountain farming, organic farming, cultivation of medicinal plants, zootecnics”<sup>114</sup>, but also “nature-oriented, didactic and educational tourism,

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<sup>113</sup> [Original quotation] “non solo come riserva integrale, bensì come risorsa, anche economica oltre che ambientale, da utilizzare per la promozione e lo sviluppo economico e sociale delle comunità che dal Parco sono interessate” (Micheli, 1986).

<sup>114</sup> [Original quotation] “apicoltura, agricoltura tradizionale di montagna, agricoltura biologica, coltivazione di piante officinali, zootecnia” (Micheli, 1986).

environmental excursions, science-based stays and visits, agrotourism"<sup>115</sup> (Micheli, 1986).

It is worth pointing out the significance that was also attributed during the conference to all these aspects, in addition to that of nature conservation, because a few years later, when the WWF produced its official proposal for a nature park, there was an aggressive opposition to the project on the grounds that implementing a greater level of protection in the Lagorai would disempower the people of the valleys and deprive them of their historical rights on the territory and its resources. These were obviously fabrications since every single conservation project that had been proposed over the years had always featured a unifying denominator: the involvement of local communities in the management of the park and its resources. Indeed, everyone knew that it is not 'with repressive regulations that a park should be supported and justified'<sup>116</sup> (Tomasi, 1986).

Despite the numerous conferences and initiatives in favour of a natural park, however, it was precisely between the 1980s and 1990s that the Lagorai area faced the greatest risk of massive public and private land speculation. In truth, many of the most large-scale and invasive projects were often stopped in time thanks to the action of citizens, public bodies, and above all local associations that were active in the area. In some cases, however, there was a much slower and creeping predatory assault on the environment, which occurred in the form of many small-scale projects that were less easy to monitor and stop in time (WWF Borgo Valsugana Group, 1988).

In 1982, the company *SAVA - Società Anonima Veneto Alluminio* submitted a formal request to divert water from the Alto Vanoi (the upper Vanoi Valley) and exploit it to generate electricity. This project had actually already been proposed once several years earlier, but at that time it had been blocked by various offices of the Autonomous Province of Trento because it posed great threats to the natural balances of the Vanoi valley and to the health of numerous waterways (Giunta Provinciale della Provincia Autonoma di Trento, 1978). Again in 1982, when it was repropoed in an allegedly "less impactful" form, it received new harsh criticism, especially from environmental

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<sup>115</sup> [Original quotation] "turismo naturalistico, didattico o con finalità divulgative, percorsi ambientali, soggiorni e visite con finalità scientifiche, agriturismo" (Micheli, 1986).

<sup>116</sup> [Original quotation] "con norme repressive che si sostiene e si giustifica un parco" (Tomasi, 1986).

associations, A.C.L.I., and the municipal administrations of Pieve Tesino and Castello Tesino (A.C.L.I. del Cismon/Vanoi/Mis, 1982). In the end, thankfully, the project was not implemented.

In 1984, two private companies (*C.E.L.T.A. S.r.l.* and *Società Idroelettrica Val Campelle*) launched a project to build a hydroelectric mega-plant in the beautiful Val Campelle. Such an infrastructure could have potentially caused irreparable damage to the entire habitat of the valley if it were built. As if this were not enough, the ecosystem of the valley had already been partly spoiled by the recent construction of some tourist cottages. The plan for the hydroelectric plant called for the diversion of water from the stream Rio Caserine in Val Caldenave, the abstraction of water from the Rio Montalòn, Rio Valsorda and Rio Fontane, the construction of a hydroelectric power plant downstream, and finally also the installation of long power line cables throughout the entire Val Campelle, all the way to Pontarso. The power produced by the entire plant, according to estimates, would have been barely more than a thousand Kw and only for three or four months a year; this means that during the periods of peak productivity it would have been able to cover only an infinitesimal percentage of the energy demand of the Valsugana. Suffice it to say that during the 1980s the Borgo Valsugana Steel Plant alone required approximately fifty thousand kilowatts to operate (WWF Borgo, 1984). It was only through great opposition and official complaints to the office *Servizio Acque Pubbliche* of the Autonomous Province of Trento that the Borgo Section of WWF - which soon gained support from the municipalities of Telve and Pieve Tesino, the local fishing association, and a number of private individuals - was able to have the project stopped in time.

Then, in 1988, the assault on the Lagorai territory became even fiercer. The Italian gas company *SNaM - Società Nazionale Metanodotti* decided it wanted to run a new methane pipeline through the middle of the Lagorai, through the Manghen Pass. The goal was to minimize the distance that gas would have had to travel to get from the Valsugana to the Fiemme Valley, which along with the Cembra and Fassa Valleys was not yet connected to the gas grid. This meant that the pipeline would have had to travel throughout the entire Calamento Valley, Manghen Pass, and Cadino Valley. Such a project, if implemented, would have resulted in the devastation the very heart of the Lagorai. This was not only because of all the construction sites and constant

maintenance interventions, but also because of the impacts of semi-insurmountable ecological barrier on wildlife, and the risks of an ecological disaster in the event of gas leaks. Thanks to the efforts of the Italian WWF and the Council of the Autonomous Province of Trento itself, however, the construction of the methane pipeline was eventually blocked, with methane still being delivered to the Fiemme Valley through other alternative routes along the Adige Valley (Casanova, 1989b; Boschele, 1988; Bonazza, 1989a; WWF Sections Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1989; "In val Calamento," 1989).

In 1988 there was also a proposal for a new paved route along the Fiemme Valley, connecting Molina and Predazzo. The new road, which was also included in the Provincial Urban Plan, was not intended to replace the old one, but was instead a completely redundant addition to it (Casanova, 1988c; "Strada di fondovalle" 1988).

Finally, in that same year, another greedy project was presented for the opening of three new quarries and the construction of a paved road for trucks in the lower Travignolo Valley, at the northern end of the Lagorai. At the time, this area had, even more than now, features of environmental integrity and naturalistic value, especially in the vicinity of the gorges of the Rio Travignolo. Not surprisingly, the entire valley had already been recognized as an area of worthy of environmental protection under the Provincial Urban Plan (Casanova, 1989a; Casanova, 1990a; "La forra «violentata»", 1988).

Then, around 1990, the area of Passo Rolle, which had already been extensively exploited for tourism, was further degraded with the construction of new chairlifts and an excessive number of snow fences, designed to reduce the risk of avalanches on the ski slopes (Casanova, 1990b).

In June 1991, the Community of Fiemme drew up a new *Programma di interventi per il potenziamento della viabilità forestale*<sup>117</sup>, a measure that budgeted as much as 10 billion Italian lire for the opening and widening of new forest roads in the Fiemme Valley, in addition to a number of them that had already been built and broadened in previous years (Bonazza, 1989c). Among other justifications for this program was a

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<sup>117</sup> [Translated title] "Programme of interventions for the Upgrading of the forest road network".

desire to "act soon and quickly to upgrade the road network prior to the introduction of additional and more substantial constraints"<sup>118</sup> (Comitato pro Val di Fiemme & WWF di Fiemme e Fassa, 1991), a disarming motivation that reveals the true concern of some local politicians: having to deal with environmental protection policies that seemed too restrictive and thus hindered some of their plans for the alleged economic "development" of the Fiemme Valley and the surrounding mountains.

In the mid-1990s, none other than Silvio Berlusconi attempted to purchase the entire Val Cia, but fortunately he didn't succeed. His original plan was to launch a huge construction project and turn the entire valley into a tourist hotspot boasting hotels, villas, boutique stores, and a ski resort. He wanted to turn the valley into something dangerously akin to the all too touristy Cortina d'Ampezzo.

Finally, in 1998, two new projects were presented: one for a mine in the heart of the Vanoi, between Canal San Bovo and Caoria, and another one for the construction of a massive 100-meter-high dam in the lower Vanoi Valley. If it were built, this dam would have flooded the entire Cortella Valley with 30 million litres of water, from the hamlet called Bellotti to the outskirts of Canal San Bovo.

Moreover, the construction of this dam, which had also been suggested in the previous decade, would have further damaged the Vanoi and Cismon streams, whose ecosystem had already been heavily damaged because of previous derivations and concrete weirs. Fortunately, the dam, which had been propounded by the *Consorzio di bonifica Pedemontano Brenta di Cittadella* (PD), was ultimately not erected, and the Vanoi stream was instead turned into a fluvial park, so as to prevent any future invasive hydroelectric exploitation action (Sartori, 1997; Cardini, 1998; Zurlo, 1998a; Zurlo, 1998b; "Fonzaso dice «no»", 1998; Bonaccorso, 2001a; Bonaccorso, 2001b; Orsingher, 2001; Cardini, 2001). It is fair to point out that unfortunately in 2023 the project for a dam in the Vanoi, and precisely in Val Cortella, resurfaced. The design was almost identical to that of the late 1990s, but today it seems more wicked, considering that in 2010 Val Cortella was hit by a landslide, and that this same valley

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<sup>118</sup> [Original quotation] "muoversi presto ed in fretta per potenziare la viabilità prima dell'introduzione di altri e più pregnanti vincoli" (Comitato pro Val di Fiemme & WWF di Fiemme e Fassa, 1991).

is listed in the highest hazard class (P4) of the CSP (*Carta di Sintesi della Pericolosità*<sup>119</sup>) drawn up by the Autonomous Province of Trento.

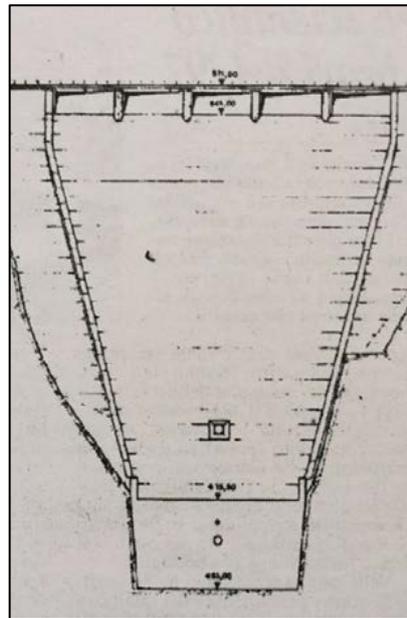


Figure 28: An illustration of the 100-metre-high dam proposed by the Consorzio di bonifica *Pedemontano Brenta* di Cittadella.<sup>120</sup>

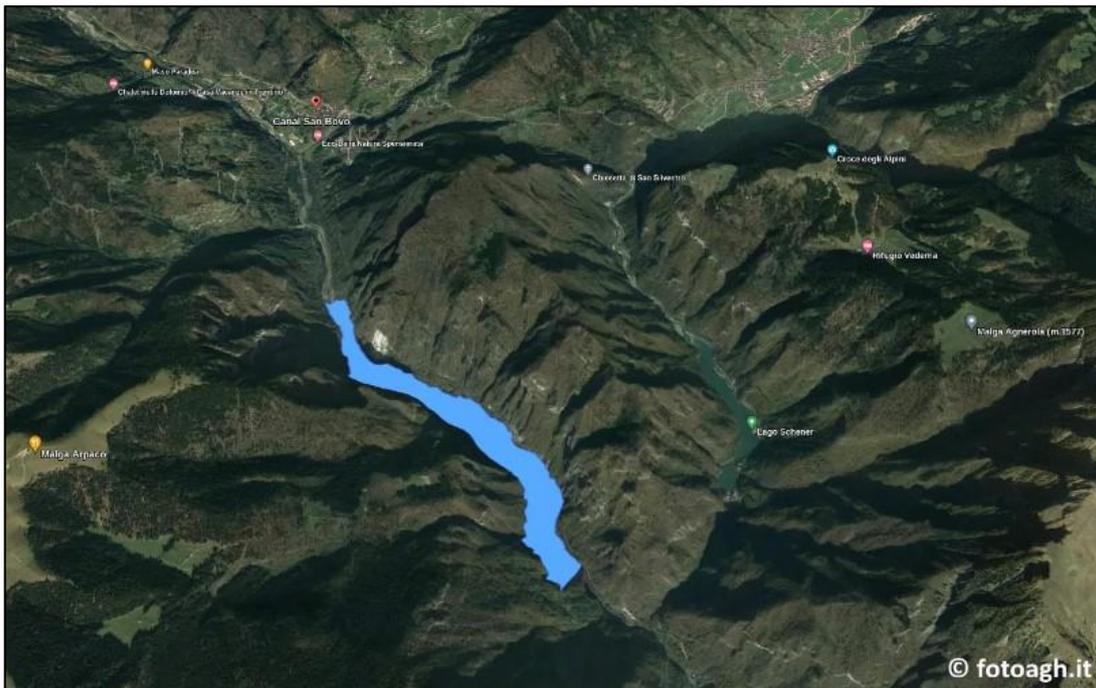


Figure 29: Image showing the way in which the Val Cortella would be devastated in the event of a dam being constructed. It is worth pointing out that there are already four other dams in the area: the Val Noana dam (TN), the Val Schener dam (TN), the Ponte Serra dam (BL), and the Corlo dam (BL).<sup>121</sup>

<sup>119</sup> [Translated title] “Hazard index map”.

<sup>120</sup> Image from Selva, 1998.

<sup>121</sup> Image by Alessandro Ghezzer, 2023 - [www.fotoagh.it](http://www.fotoagh.it)

In addition to all these large-scale works, however, in the 1980s and 1990s the Lagorai was also threatened on a daily basis by the activities of single actors: there were vehicles driving up to the mountains through forest roads, tourists abandoning massive amounts of rubbish near mountain lakes – more than 6 cubic metres of waste were retrieved from the Laghetti di Bombasel alone –, snow cannons drying up high-altitude lakes, motocross bikes in summer and snowmobiles in winter roaming the trails, wrecking the ground and disrupting the silence of the Lagorai (“Prego, fermate quel cannone”, 1989; “Pulizia ai laghi”, 1987; “«Rimini sui monti»”, 1989; “Per la neve”, 1989).

It was precisely to prevent further damage caused by urban speculation, unpermitted construction, and other large projects of various sorts that in the 1980s and early 1990s the delegation of WWF in Trentino worked tirelessly on a solid, well-structured, and feasible nature park proposal which was based on the authoritative opinion of a large number of local and national experts. In fact, in order to ensure the highest possible standards and feasibility of the project, the WWF called upon numerous distinguished consultants and held seminars among experts, such as the one entitled *Progetto per il Parco Naturale del Lagorai*<sup>122</sup>, which was held on May 15, 1988, in Borgo Valsugana and was attended by illustrious speakers such as Gino Tomasi, Francesco Borzaga, Alvisè Vittori, Walter Micheli, Fulco Pratesi, Sergio Boschele (Boato, 1988; WWF Sezioni Bassa Valsugana e Tesino, Valli di Fiemme e Fassa, 1988; “Stamane convegno”, 1988; “Vogliono il Lagorai”, 1988). The quality of the proposal put forward by WWF was so high that it frequently attracted the support of a substantial part of the provincial political scene, not only among those politicians most concerned with collective welfare and environmental conservation, but also among a number of representatives belonging to parties that were traditionally not particularly concerned about environmental issues (“Lagorai: tanta voglia”, 1988; “Parco? Certo ma”, 1988; “Sì al parco”, 1988). Undoubtedly, the legal framework of that period certainly seemed to be quite favourable to the establishment of a natural park. Under the 1987 revision of the Provincial Urban Plan, in fact, the mountainous territory of the Lagorai, Rava and Cima d'Asta Groups had been listed on a level just below that of the two already

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<sup>122</sup> [Translated title] “Project for the Lagorai Natural Park”.

existing nature parks in Trentino, and had also been included among the *Aree di Tutela Ambientale Primaria*<sup>123</sup> (Sezioni SAT di Borgo Valsugana - Tesino, 1991).

When the WWF formulated the park proposal for the Lagorai, it sought to actively involve the local population of the valleys in the project, as it was deemed appropriate that the inhabitants of the surrounding areas should “become protagonists in the activity of the park and its management”<sup>124</sup> (WWF - Delegazione del Trentino, 1988; Delvai, 1988). For this reason they organised lectures, debates, ‘nature weeks’<sup>125</sup>, conferences and discussion tables that were aimed at informing as well as listening to the needs and requests of the local communities. The Trentino Delegation of the WWF, for example, organised a series of educational and informative meetings for native people, under the title *Lagorai: un parco da costruire insieme*<sup>126</sup>. As many as eight dates were scheduled in various locations of the Valsugana Valley and another five in the villages of the Fiemme Valley (Chinetti, 1988; “Confrontiamo le rispettive idee”, 1989). With the same aim of further involving and informing the populations of the valleys on the motivations behind the creation of a natural park in the Lagorai and on the benefits that such a project could also bring to the local economy, the WWF made an effort to organise proper itinerant photographic exhibitions (Morandini, 1988c; “Si apre a Predazzo”, 1988; “Lagorai-Cima d’Asta”, 1988; “Mostra Wwf”, 1988; “Lagorai in mostra”, 1988; Casanova, 1989c). As a result of the high turnout at the exhibitions, which were attended by over 25,000 people, the issue of the Lagorai park became something very close to the people's hearts. This was also achieved through a word-of-mouth phenomenon. In order to involve the local population even more, a thirty-minute documentary film was made, called *Sguardi sul Lagorai*<sup>127</sup>. This short film was screened predominantly in schools, in order to raise awareness and educate young generations on environmental protection (“Il Parco naturale è una ricchezza”, 1988). Thanks to all these efforts to inform and involve the public, the WWF succeeded in obtaining the support of local authorities, the *Comprensori dell’Alta e Bassa Valsugana*, the municipality of Telve (which in those same years had designated its

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<sup>123</sup> [Original designation] “Areas of Paramount Environmental Protection”.

<sup>124</sup> [Original quotation] “divenire protagonista della vita del parco e della sua gestione” (WWF - Delegazione del Trentino, 1988; Delvai, 1988).

<sup>125</sup> [Original name] “settimane naturalistiche”.

<sup>126</sup> [Translated title] “Lagorai: a park that we should establish together”.

<sup>127</sup> [Translated title] “Glimpses of the Lagorai”.

entire municipal territory as a Nature Reserve), the SAT (the CAI of Trentino), and part of the provincial board, which suggested the possible boundaries of the park in the PUP (Casanova, 1989g; “Sat, progetto-Lagorai”, 1989).



Figure 30: The logo proposed by the WWF for the new Lagorai Natural Park. The marmot, the undisputed protagonist of all the high-altitude rocky slopes of the Lagorai, was chosen as the symbol of the park.<sup>128</sup>

The primary objective of the WWF, given the political and economic framework in which they were operating, and the land speculations that were occurring at the time, was to establish a park in the Lagorai area in order to “stop the continuous attack [...] on this territory and thus sternly and rigorously prevent the expansion of roads and urbanisation, and the creation of yet additional facilities within the mountain range”<sup>129</sup> (WWF - Delegazione del Trentino, 1988). In addition to the protection and restoration of the Lagorai environment and landscapes, however, the Nature Park proposal also encouraged the recreational and sustainable utilisation of the natural environment, as well as the social, economic, and cultural promotion of the communities living in the areas falling within the park’s radius of influence. One of the suggested ideas, for

<sup>128</sup> Logo from a sticker by WWF, n.d.

<sup>129</sup> [Original quotation] “fermare l’attacco continuo [...] a questo territorio e quindi impedire con severità e rigore l’espandersi delle viabilità e dell’urbanizzazione, della creazione di ulteriori servizi dentro il gruppo montuoso” (WWF - Delegazione del Trentino, 1988).

example, was to establish the headquarters of the Park in the Vanoi valley, an area that was experiencing poverty at that time. The park could definitely have offered an opportunity for economic recovery, with positive impacts on the entire local population and with the creation of new jobs (Zorzi, n.d.; WWF Gruppo di Borgo Valsugana, 1989c; Anelli, 1989a; Bonat, 1989; “Quanto lavoro”, 1989; Sezioni WWF Valli di Fiemme e Fassa, Bassa Valsugana e Tesino, 1989a).

In 1993, the WWF published a special issue as a supplement to *Panda* magazine No. 5 of May 1993, which was entirely dedicated to the Lagorai. This was the magazine *Lagorai: perché un parco*<sup>130</sup>, which we have already mentioned in a previous chapter. The release of this magazine was immediately followed by a major public presentation event, which was held in Borgo Valsugana with several appointments between 22nd and 30th May 1993. The magazine deserves credit for displaying to the general public a map of the zoning suggested by the WWF for the park, i.e. the organisation of the territory into “areas with different degrees of protection, from integral to developmental”<sup>131</sup> (Visetti, 1988).

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<sup>130</sup> [Translated title] “Lagorai: the reasons for a park”.

<sup>131</sup> [Original quotation] “aree con gradi diversi di tutela, da quella integrale fino a quella di sviluppo” (Visetti, 1988).

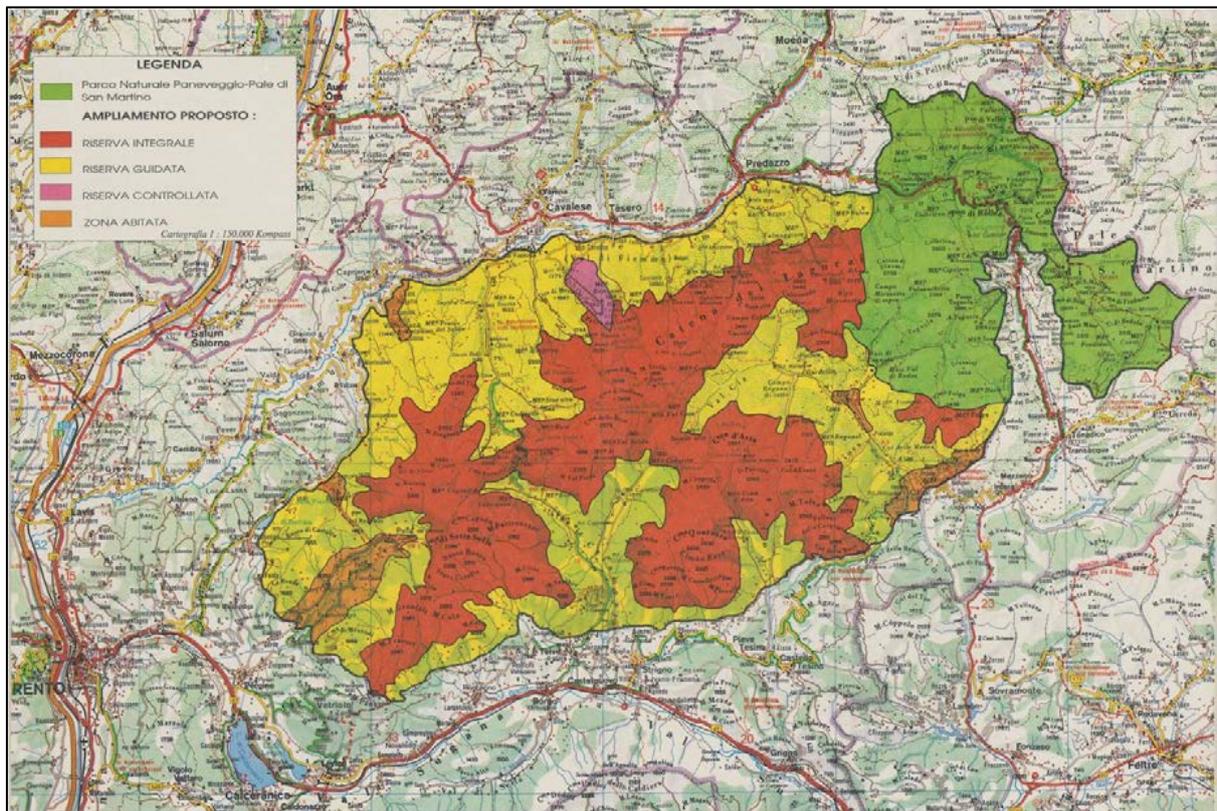


Figure 31: The zoning of the Lagorai-Rava-Cima d'Asta Natural Park suggested by the WWF Delegation of Trentino, displayed here on a Kompass map with a scale of 1:150,000. The park was supposed to include four types of areas within its perimeter, each with a different degree of environmental protection: inhabited area, controlled reserve, guided reserve, and integral reserve.<sup>132</sup>

In short, the proposal for a natural park in the Lagorai presented by the WWF Sections of Bassa Valsugana and Tesino, and of the Fiemme and Fassa Valleys, was truly impeccable since it did not overshadow anyone's legitimate needs. Many observers began to legitimately believe that the Lagorai Natural Park would be instituted within a few years, given the degree of involvement and appreciation for the project on the part of the majority of both the local communities and the provincial government. The latter was concurrently working to even pass a law for the protection of the entire provincial territory and the creation of three more parks, in addition to the two already existing ones ("Lagorai, destinazione parco", 1988; "Lagorai: la Provincia", 1989). Public support was particularly significant from the population and municipalities on the Valsugana side, as well as from the entire *Comprensorio della Bassa Valsugana e del Tesino*<sup>133</sup> ("Comprensorio favorevole", 1988). Mario Malossini, who at the time was the president of the provincial council, together with Walter Micheli, the vice-president, held

<sup>132</sup> Image from WWF - Delegazione del Trentino, 1993.

<sup>133</sup> [Translated] "Bassa Valsugana and Tesino District".

a speech at a conference about the Lagorai in Borgo and they both assured that the Lagorai Natural Park would most certainly be established, not only to give due value to the natural beauty and peculiarities of the Lagorai, but also to safeguard them from the ever increasing risks of land speculation (Zorzi, 1989c). On 16 June 1993, Provincial Councillors Sandro Boato and Roberto Franceschini, two members of the Greens of Trentino, officially presented Draft Law No. 227 for the *Istituzione del Parco Naturale «Lagorai-Cima d'Asta»*<sup>134</sup> (Boato & Franceschini, 1993) which, however, was never approved (Boato & Franceschini, 1993).

The SAT, too, declared its support for the implementation of a park, not so much because of its appreciation for the park institution itself, but rather for the unquestionable need to preserve the natural heritage of the Lagorai from speculations of all kinds (Filippi, 1989). The president of the SAT of Pergine, Graziano Grisenti, remarkably declared: “We do not seek the park at all costs, neither some sort of zoological garden; instead, long-term protection should be solicited, i.e., allowing people to live and relish [the Lagorai] while also stopping certain initiatives, such as new trails, the methane pipeline on the Manghen, the Caoria-Fiemme route, the ban on cars beneath 5 Croci, and similar issues”<sup>135</sup> (“Lagorai, la Sat”, 1989).

As further evidence of the widespread public support for the park initiative, at least among the populations living in Valsugana, consider here the *Sondaggio di opinione sull'idea di parco nel Lagorai-Rava-Cima d'Asta*<sup>136</sup>. This survey was organized in 1991 by the SAT Sections of Borgo Valsugana - Tesino and conducted in Valsugana, i.e., in the municipalities of the southern part of the Lagorai. Out of a total of 1.173 questionnaires handed out to the population, 733 were returned to the analysts. The purpose of the survey was to find out whether or not there were the right conditions and willingness among local communities for the establishment of a natural park in the Lagorai. The survey revealed a strong appreciation for several values of environmental integrity in the area (in order of first preference: the high degree of wilderness, the

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<sup>134</sup> [Translated title] “Establishment of the «Lagorai-Cima d'Asta» Natural Park”.

<sup>135</sup> [Original quotation] “Noi non cerchiamo il parco a tutti i costi, nemmeno una specie di giardino zoologico; è da chiedere, invece, una tutela a lungo termine, vale a dire permettere che la gente vi possa vivere e trarre giovamento bloccando al contempo certe iniziative, quali nuovi sentieri, il metanodotto sul Manghen, la strada Caoria-Fiemme, il divieto delle automobili sotto 5 Croci e cose simili” (“Lagorai, la Sat”, 1989).

<sup>136</sup> [Translated title] “Opinion Poll on the concept about a Park in the Lagorai-Rava-Cima d'Asta”.

abundance of flora and fauna, the mountaineering-hiking side, the limited level of anthropization, the human and traditional activities, the historical heritage; others) as well as a strong support for the establishment of park, with 64.9% of respondents in favour of the park and 84.3% expressing the need to also incentivize traditional mountain-related activities (Sezioni SAT di Borgo Valsugana - Tesino, 1991).

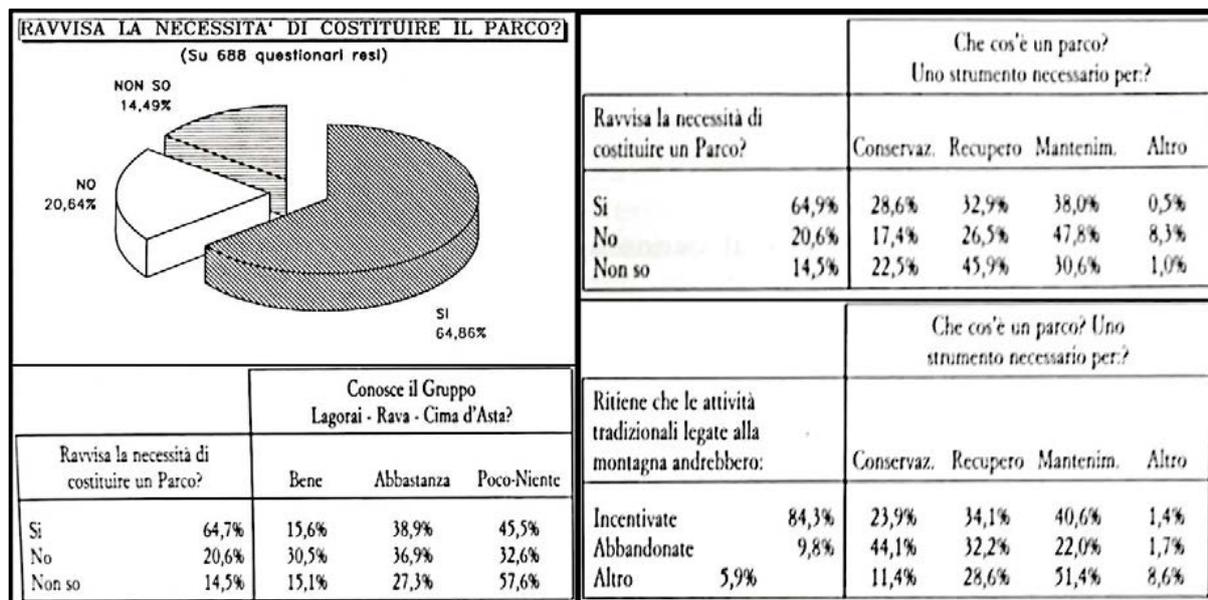


Figure 32: Here are reported some of the most significant results that emerged from the survey *Sondaggio di opinione sull'idea di parco nel Lagorai-Rava-Cima d'Asta*, which was carried out in 1991 by the local SAT Sections of Borgo Valsugana - Tesino.<sup>137</sup>

Despite all these positive preconditions, the project for the park collided with the blinkered opposition of several local politicians, some of whom were from Valsugana (Sezione W.w.f. Bassa Valsugana e Tesino, 1990), but most of all from the Fiemme Valley. As a matter of fact, a genuine media campaign was waged against the promoters of the park, the local WWF sections, and their representatives (Casanova, 1989f). For instance, the Scario of the Magnifica Comunità di Fiemme, Bruno Sommariva, often lashed out with violent criticism against Luigi Casanova, the forest caretaker of Fiemme and representative of the WWF of Fiemme and Fassa, who was "guilty" in his eyes of being one of the most active promoters of the park and of the environmental conservation of the Lagorai ("Casanova e Sommariva", 1989). Furthermore, numerous local public administrators from the Fiemme area deserted most of the meetings with the public they had been invited to by the WWF. They thereby managed to evade any constructive debate and even succeeded in

<sup>137</sup> Diagram and tables adapted by Enrico Carraro from Sezioni SAT di Borgo Valsugana - Tesino, 1991.

discrediting the entire point of the conferences organised by pro-park campaigners, as these events sometimes looked as if they were meetings for environmentalists only (“Vi spieghiamo cos’è”, n.d.).

The Fiemme local authorities feared that their economic interests and gains would be compromised if the Lagorai Nature Park was actually established (Morandini, 1988a; Morandini, 1988b). Their concern was such that on one occasion the scario of the Magnifica Comunità di Fiemme, Dr. Bruno Sommariva, actually went so far as to declare that over the centuries the inhabitants of Fiemme, called *Vicini*, and the *Magnifica* had demonstrated that they were well capable of managing the forest heritage decently without the instructions of naturalists and ecologists (“La Magnifica Comunità”, 1989). On a later occasion, he emphasised: “The Community of Fiemme has embraced conservative principles for the use of resources since ancient times [...]. Nowadays, woodland utilisation is carried out according to criteria of rationality and technical skill”<sup>138</sup> (“«Nessun piano parco”, 1992).

It was therefore by means of deception and with phoney speeches that local politicians succeeded in spreading the misconception that the woodlands and mountains of the Fiemme Valley had always been administered in a perfect manner, and that therefore there was no need for any additional conservation measures (Felicetti, 1993b). Moreover, the population was led to believe that the creation of a park was likely to result in the loss of many traditional prerogatives of land use and forestry resources for the people of Fiemme. On the councillors of Ziano, Gianfranco Zorzi, also stated that even the *Legge Micheli* of 1988, which had been instrumental in setting up the first two regional parks in Italy, could have led to “a centralisation of management that, by overruling the autonomy of the local populations, would end up damaging the very environment that it was intended to preserve”<sup>139</sup> (“Il parco naturale del Lagorai è un attentato”, 1988). It was wrongly assumed that the park authority would override the will and rights of the local citizens. This conjecture, however, was clearly unfounded, given that since the very beginning of the project, the promoters of the park had

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<sup>138</sup> [Original quotation] “La Comunità di Fiemme adottò fin dall’antichità criteri prudenziali per l’utilizzo delle risorse [...]. Oggigiorno, le utilizzazioni boschive avvengono secondo criteri di razionalità e di tecnica” (“«Nessun piano parco”, 1992).

<sup>139</sup> [Original quotation] “un accentramento della gestione che, scavalcando l’autonomia delle popolazioni locali, finirebbe per arrecare danni allo stesso ambiente che si vorrebbe preservare” (“Il parco naturale del Lagorai è un attentato”, 1988).

promised that each valley community would be allowed to “live, grow, engage in new aspects of management, seek its own viable future and full administrative autonomy within the framework of the park proposed by the environmentalists”<sup>140</sup> (Casanova, 1989d).

In order to totally dismantle the conservation project for the Lagorai in the eyes of the local people, the administrators of the *Magnifica Comunità di Fiemme* went as far as organising a conference to demonstrate that the Park was unnecessary and represented a harmful initiative for the commons and centuries-old traditions of the valley. In a wholly different way from the WWF's meetings which involved administrators, experts and citizens, the conference organised by the *Magnifica Comunità di Fiemme* was predominantly reserved for speakers who could corroborate the thesis of the detractors of the project, and very little space was given to the supporters of the park instead. The results of the conference were then collected in the periodical of "information, history, culture, current affairs"<sup>141</sup> *La Comunità di Fiemme* of September 1993, which went by the issue heading *Lagorai, perché cambiare?*<sup>142</sup> (Comunità di Fiemme, 1993; Morandini, 1993a). The periodical featured two inserts: a series of maps showing which areas would allegedly be seized from the valley community, and a poorly made project of repeat photography designed ad hoc to instrumentally demonstrate that during the 20th century, under the management of the Magnifica Comunità di Fiemme, the woodlands of the valley had grown in extension and regained their lushness. The magazine circulated widely in the Fiemme Valley and strongly influenced the negative perception of the local inhabitants towards the Park concept. However, all of the criticisms levelled at the WWF during the conference were clearly ill-founded, “nonsense deliberately put about to create dissent” (Comunità di Fiemme, 1993), as the Greens town councillor of Cavalese Ruggero Vaia lamented during the course of that same convention.

Such was the level of resentment against those who wanted to preserve the Lagorai mountain range and its environment, that in a press release Claudio Delvai, the

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<sup>140</sup> [Original quotation] “vivere, svilupparsi, inserirsi in nuovi aspetti gestionali, trovare un suo valido futuro e piena autonomia organizzativa proprio nella costituzione del parco proposto dagli ambientalisti” (Casanova, 1989d).

<sup>141</sup> [Original quotation] “informazione, storia, cultura, attualità” (Comunità di Fiemme, 1993).

<sup>142</sup> [Translated title] “Lagorai, why should we change?”.

provincial vice-secretary of the Autonomist Party of Trentino-Tyrol (PATT), and Sergio Vanzo, a municipal councillor of the same party for the Fiemme Valley, who were both against the creation of a park because of their obvious economic interests, went so far as to accuse the WWF and other promoters of the park of attempting a “sleight of hand [...] to the detriment of Fiemme”<sup>143</sup>; they even compared them to “Landsknechts [who had come back] to plunder Fiemme”<sup>144</sup> (Delvai & Vanzo, n. d.; Felicetti, 1993a).

For this reason, the supporters of the park project rightfully accused some of the local politicians of “fuelling clichés that served «only to stir up resentment, misunderstandings, confusion and the impossibility of engaging in any dialogue with the social reality»”<sup>145</sup> (“Vi spieghiamo cos’è”, n.d.).

In 1995, in order to re-launch the park project, its proponents organised a collection of signatures in favour of the initiative throughout the entire eastern part of Trentino, which garnered no less than 10.750 signatures. In light of such strong popular support, the Third Legislative Commission of the Provincial Council decided to initiate a so-called *listening operation*<sup>146</sup> to reassess the feasibility of the Lagorai Park. The administrators of the Fiemme Valley, however, once again turned against the environmental conservation of the Lagorai, and accused the pollsters of collecting the majority of signatures from outside the Fiemme, Primiero and Fassa Valleys [the last two valleys having nothing to do with the Lagorai, Editor’s Note], i.e. in the Adige Valley, the Cembra Valley and, above all, in Valsugana. Therefore, due to their opposition, the Provincial Legislative Commission eventually decided to “respect the will of the *Vicini* [of Fiemme] not to take decisions over the heads of the citizens”<sup>147</sup> (Chinetti, 1995).

In 2003, almost ten years after the discussion on the nature park had died down, a new terrifying large-scale building project emerged, posing a threat to the environmental

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<sup>143</sup> [Original quotation] “furto con destrezza [...] ai danni di Fiemme” (Delvai & Vanzo, n.d.; Felicetti, 1993a).

<sup>144</sup> [Original quotation] “Lanzichenecci [tornati] a saccheggiare Fiemme” (Delvai & Vanzo, n.d.; Felicetti, 1993a).

<sup>145</sup> [Original quotation] “alimentare luoghi comuni che servivano «solo a creare rancori, incomprensioni, confusione e impossibilità di dialogo con la realtà sociale»” (“Vi spieghiamo cos’è”, n.d.).

<sup>146</sup> [Original name] “operazione ascolto”.

<sup>147</sup> [Original quotation] “rispettare la volontà dei Vicini [di Fiemme] a non prendere decisioni che passino sulla testa dei cittadini” (Chinetti, 1995).

and cultural integrity of the Lagorai. We are referring here to the *Baite del Lagorai*<sup>148</sup> megaproject, promoted by the Paterno group and envisaged by the Dellai provincial administration as part of the so-called *Patti Territoriali del Tesino*<sup>149</sup>. The idea of the proponents was to revitalise and transform tourism in the Lagorai area by renovating old mountain huts and building new facilities, which would then be destined for guests “with medium to high culture and income”<sup>150</sup> (Gabrielli, 2005a). The initial idea was to create more than 2,000 new sleeping accommodations, but this was later halted due to the protests of environmentalists and the stoppage imposed by the Province. The project was halted also as a result of the strong opposition of both the then Provincial assessor for the Environment, Walter Micheli, and the University of Venice, which had conducted several feasibility studies. A new project was therefore formulated by the funders: an investment of 60 million euro to restore approximately one thousand buildings and to build four new four-star resorts in already urbanised areas at the bottom of the valley, for a grand total of approximately 1,100 sleeping accommodations. There were further plans to establish special minibus lines to transport tourists to the surrounding natural areas (Gabrielli, 2005a; Gabrielli, 2005c). In short, it was a real attempted assault on the Lagorai, especially as regards the transformation of disused mountain huts, alpine pastures and farmsteads into facilities for tourists, to be sold or rented. There was the aggravating factor that all of these structures would be operated by a single millionaire owner, instead of the local people and communities of the valleys (Gabrielli, 2005b). There was a real risk of fostering a hit-and-run type of tourism, consisting of luxurious holiday homes, spas, new paved roads, and high-priced hotels intended for rich tourists. Notwithstanding the reassurances of the Province and the promise of the Tridentine Museum of Natural Sciences to oversee the proper implementation of the *Baite del Lagorai* project, which was to be developed over a 10-year period so as to allow a prolonged assessment of its impact on the environment, the initiative was fortunately halted.

In 2010, the local newspaper L'Adige rekindled the discussion on the idea of a natural park in the Lagorai-Rava-Cima d'Asta area. This led to a renewed debate, aimed at understanding whether or not the grounds for a park had been established in the

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<sup>148</sup> [Translated name] “Mountain huts of the Lagorai”.

<sup>149</sup> [Translated name] “Territorial Pacts for the Tesino area”.

<sup>150</sup> [Original quotation] “di cultura e di reddito medio-alti” (Gabrielli, 2005a).

meantime. The discussion, which was held in written form and published in the newspaper L'Adige, showcased a variety of different but not entirely contrasting opinions. The provincial assessor for Town planning and local authorities, Dr Mauro Gilmozzi, advocated that it was necessary to involve all the stakeholders, from the administrations down to the people, in a process of economic development of the Lagorai. He therefore did not envisage the creation of a park or any substantial changes to the established traditional methods of managing the mountains and their resources (Gilmozzi, 2010).

On the other hand, the environmentalist Luigi Casanova, who had been one of the main proponents and supporters of the park, denounced thirty years of abuses and over-exploitation of the mountains, which needed to be redressed in order to regenerate the territory and only then possibly proceed with the creation of new protected areas or a park. He advocated a park that would not be merely symbolic or act as a “green blanket”<sup>151</sup> to cover abuses and mismanagement. Instead, he called for a major joint project initiated by all local municipalities and aimed at the creation of genuinely sustainable agricultural and environmental districts (Casanova, 2010).

Dr. Gino Tomasi, director emeritus of the Tridentine Museum of Natural Sciences, emphasised once again the outstanding natural beauty and historical significance of the Lagorai area, which he considered to be well worth a real natural park, even after more than 45 years since he had first proposed it (Tomasi, 2010).

The regional council member of the Greens, Roberto Bombarda, insisted on the need to establish new parks in Trentino, including the Lagorai park, but with a new meaning: namely that of “local nature parks”<sup>152</sup>, i.e. networks of already established nature reserves that should be managed in a coordinated manner. In his opinion, this was the most appropriate and effective way to achieve a balance between environmental protection and the involvement of the newly formed Valley Communities in the management of the park (Bombarda, 2010).

Dr. Tiziano Mellarini, the Provincial assessor for Agriculture, Forestry, Tourism and Promotion, expressed similar positions to those of the regional councillor Bombarda.

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<sup>151</sup> [Original quotation] “coperta verde” (Casanova, 2010).

<sup>152</sup> [Original quotation] “parchi naturali locali” (Bombarda, 2010).

He was absolutely in favour of a park, which he considered an excellent opportunity for nature conservation and economic recovery in the valleys. However, he also stressed the need for economic development, innovation, and sustainability throughout the different districts of the Lagorai. Assessor Mellarini therefore expressed his approval for a park established “through dialogue with the local populations and administrations, in the name of maximum cooperation and with no top-down impositions”<sup>153</sup> (Mellarini, 2010).

Architect Enrico Ferrari, having worked for almost thirty-five years in the Landscape Protection Office of the Autonomous Province of Trento, also saw great opportunities in the Lagorai. More specifically, he suggested the creation of a Lagorai Park to revitalise the Valsugana by means of slow and sustainable tourism, in the framework of a “green industry”<sup>154</sup> based on care for the environmental and historical heritage of the territory and respect for all local traditions and needs. While in some respects Architect Ferrari displayed care for the dimension of environmental protection, in others he seemed to consider the Lagorai area simply as an economic resource (Ferrari, 2010).

Michele Nardelli and Luca Zeni, who were both provincial councillors of the Democratic Party in Trentino, expressed a similar stance to the one held by Enrico Ferrari. Both of them recognised the environmental integrity and uniqueness of the Lagorai as an enormous opportunity for the economic and societal revival of Valsugana, an area that had been plagued by emigration, speculative industrial development, and mismanagement for too many years. The councillors Nardelli and Zeni therefore suggested “a different development model for the Valsugana”<sup>155</sup>, one that could be ascribed “to the Lagorai network, to tourism [...], to high-quality agriculture and animal husbandry, to thermal tourism, and to the appreciation of places and the environment”<sup>156</sup> (Nardelli & Zeni, 2010).

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<sup>153</sup> [Original quotation] “attraverso il dialogo con le popolazioni e le amministrazioni locali, all’insegna della massima condivisione e senza imposizioni dall’alto” (Mellarini, 2010).

<sup>154</sup> [Original quotation] “industria verde” (Ferrari, 2010).

<sup>155</sup> [Original quotation] “un altro modello di sviluppo per la Valsugana” (Nardelli & Zeni, 2010).

<sup>156</sup> [Original quotation] “al sistema Lagorai, al turismo [...], all’agricoltura e alla zootecnia di qualità, al termalismo e alla cultura dei luoghi e dell’ambiente” (Nardelli & Zeni, 2010).

A few months later, Laura Zanetti, the president and co-founder of the *Libera Associazione Malghesi e Pastori del Lagorai*<sup>157</sup>, also wrote an article in the pages of the newspaper L'Adige. She expressed her support for conservation measures in the Lagorai and even for a possible natural park, provided such measures also addressed the various local needs of all traditional and sustainable forms of animal herding and agroforestry (Zanetti, 2010).

However, there were also some critics. Franca Penasa, a regional councillor of the Lega Nord party, recalled her own experience in the management committee of the Stelvio National Park and decried the inadequacy of the park as a means for the economic, cultural, and environmental revival of the local valleys. In particular, she lamented the lack of attention paid by park authorities to the specific needs and rights of local communities (Penasa, 2010). As we have already demonstrated, however, there had never been similar issues in the case of the Lagorai Park proposed by the WWF. In fact, during the planning stages of the project, the wishes of the local communities had by no means been neglected, neither during the informational nor the participatory phase.

The extensive debate featured in the newspaper L'Adige in 2010 was followed in November of the same year by the conference *Parco del Lagorai. Vale la pena pensarci?*<sup>158</sup>. The meeting took place in Borgo Valsugana for two evenings and was organised by Europe Direct Trentino and the Edmund Mach Foundation of the Istituto Agrario di San Michele all'Adige. More than eighty people joined the discussion tables, including some leading figures from both the environmental field and other agencies active in Trentino and in the Lagorai. Nevertheless, there was scarce participation on the part of political administrators, and consequently the event did not lead to significant results. But the conference showed once again that for any initiative involving land protection, a process of bottom-up participatory planning is always indispensable (Brandalise, 2010; Europe Direct Trentino et al., 2010).

A few years later, in 2015, the Autonomous Province of Trento coordinated the workshop cycle *Progetto Integrato per lo Sviluppo Sostenibile del Lagorai*<sup>159</sup>, within the

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<sup>157</sup> [Translated name] “Free Association of the Lagorai Shepherds and Herdsmen”.

<sup>158</sup> [Translated name] “Lagorai Park. Is it worth thinking about it?”.

<sup>159</sup> [Translated name] “Integrated Project for the Sustainable Development of the Lagorai”.

framework of the Life+ T.E.N. project. The event was structured in a series of workshops and moments of debate, which were attended by various local figures including politicians, entrepreneurs, representatives of the agricultural sector, tour operators, hunters and fishermen, environmentalists, representatives of local associations, and experts. The common goal was to outline sustainable development strategies for the Lagorai that could be linked to agriculture, tourism, and nature conservation. The first introductory conference was held at the Passo Manghen Refuge on 20 October 2015, and during this opening meeting the participants expressed the need for "sustainable land valorisation, complemented by active biodiversity protection measures"<sup>160</sup> (Provincia Autonoma di Trento, 2016).

Lastly, we should also mention in this chapter the *Sportiva Outdoor Paradise* project, which was first proposed in 2017 but never implemented. This was a marketing process conceived by Lorenzo Delladio, chief executive officer and president of *La Sportiva* S.p.a., a world-leading manufacturer of outdoor footwear, clothing and equipment based in Ziano di Fiemme. The Sportiva Outdoor Paradise project envisaged the purchase by *La Sportiva* of the shares of *SITR* S.r.l. (*Società Impianti Turistici Rolle*), the company that was managing the ski lifts at Passo Rolle, in the western Lagorai. After the purchase, *La Sportiva* had planned to dismantle the ski lifts and regenerate the area in terms of both tourism and the natural environment. The whole underlying vision was that of converting an area traditionally exploited for alpine ski touring into an arena specifically dedicated to less impactful winter sports, such as ski mountaineering, snowshoeing, trekking, climbing, trail running, sledding, paragliding, and dogsledding. Although the project had the flaw of being a private venture and of focusing on an extensive tourist use of the territory, it also had a merit: it offered the possibility for an environmental requalification of Passo Rolle, an area that over the years had suffered heavily from mass tourism, excessive vehicular traffic, and invasive ski activities. The target audience of the Sportiva Outdoor Paradise Project was therefore comprised of "nature lovers and enthusiasts of the active outdoor

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<sup>160</sup> [Original quotation] "valorizzazione sostenibile del territorio, a cui si affiancano le azioni di tutela attiva della Biodiversità" (Provincia Autonoma di Trento, 2016).

lifestyle in search of well-being, sustainability, safety and simplicity”<sup>161</sup> (La Sportiva, 2017).

The project entailed huge investments by the company *La Sportiva* and was thus warmly welcomed by the general public, various local entrepreneurs, and a significant part of the political scene. Nevertheless, it received considerable opposition from some powerful and influential political figures and a few local private entrepreneurs, who deliberately bid to acquire the shares of the ski lift company SITR S.r.l. in Passo Rolle. This led to the cancellation of the project. (“Passo Rolle”, 2017; Manzoni, 2021).

## **4.2 The current environmental protection measures in place in the Lagorai mountain range and the surrounding areas**

At the present time, there are a number of environmental protection measures already in place in the Lagorai and its immediate surroundings, but these measures are not uniformly distributed throughout the mountain range. While some of them are relatively effective, others provide merely passive forms of environmental protection, and therefore we consider them to be inadequate for the integral protection of such a vast territory with such peculiar characteristics as the Lagorai.

Furthermore, several museums and local cultural institutes are also active in the area of the Lagorai mountain chain. These institutions too play an important role in the protection and enhancement of the cultural and environmental heritage of the area.

### **4.2.1 The Natura 2000 protected areas in the Lagorai mountain range**

Before discussing specifically the Natura 2000 sites located within the Lagorai mountain range, it is appropriate to briefly explain what this particular environmental protection measure consists of.

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<sup>161</sup> [Original quotation] “appassionati della natura e della vita attiva all’aria aperta, alla ricerca di benessere, sostenibilità, sicurezza e semplicità” (La Sportiva, 2017).

The Natura 2000 network is a system of protected areas that extends through the entire European Union, across all 27 Member States, in order to protect the most valuable and threatened species and habitats, both on land and at sea.

The sites of the Natura 2000 ecological network have been established on the basis of the European Nature Directives, i.e. the combined Birds Directive and Habitats Directive. These are the two oldest European environmental laws and represent one of the pillars of the European framework for nature, habitats, and biodiversity conservation.

The Birds Directive (79/409/EEC) is the older of the two laws and dates back to 2 April 1979, when it was first approved by the European Commission. It establishes a regime for the protection and management of wild birds, their eggs, and the habitats in which they live in all European territory. On 30 November 2009, the 1979 Directive was repealed and updated by the current new legislation, Directive 2009/147/EC, which became effective on 15 February 2010. The Directive, also in its original version, requires individual Member States to identify Special Protection Areas (SPAs) for the protection of all migratory bird species and 194 other bird species that are exposed to a significant threat.

The Habitats Directive (92/43/EEC) of 21 May 1992, on the other hand, is specifically focused on the conservation of natural and semi-natural habitats as well as wild flora and fauna. It aims to promote collective action to protect and preserve biodiversity and the conservation of various natural habitats in all EU Member States. The Habitats Directive, in particular, calls for the designation of various habitats of Community interest, which are labelled Sites of Community Importance (SCIs). SACs are then also referred to at the national level as Special Areas of Conservation (SACs).

It is worth remembering that Special Protection Areas, Special Areas of Conservation and Sites of Community Importance may overlap with pre-existing nature reserves, protected areas, and nature parks, pursuant to the Italian Law 394/91 for the classification of protected natural areas. In this case, as observed by the Italian Council of State Sect. VI no. 6048 of 29 November 2012, while it is possible for a SPA to be located within a protected natural area pursuant to the aforementioned Law 394/91, an ontological difference between the two protection measures is also maintained. As confirmed by Article 4, paragraph 3 of Presidential Decree No. 357 of 8 September

1997, "if Special Areas of Conservation fall within protected natural areas, the conservation measures provided for these areas by the regulations in force shall apply"<sup>162</sup> (Decreto del Presidente della Repubblica n.357, 1997, as cited in Elia, 2013).

In our particular case, the Lagorai area is home to the largest SPA in the entire Province of Trento, with an extension of approximately 46,000 hectares. The Lagorai SPA (SPA IT3120160) covers a large territory that includes part of the Val di Fiemme, Valsugana, the Paneveggio - Pale di San Martino Natural Park (which is subdivided into 6 SCIs), and seven other SCIs: *Valle del Vanoi*, *Val Campelle*, *Passo del Brocon*, *Val Cadino*, *Zona Umida Valfioriana*, *Lago delle Buse* and *Catena del Lagorai* (Sottovia, 2009).

The SPA IT3120160 is remarkably rich in terms of the different habitats and environments it contains, and this is one of the reasons why it encompasses several different SCIs. Its largest section is the porphyritic Lagorai mountain range, but it also includes the porphyritic chain between the Valles Pass and the Lusia Pass, the upper basin of the Travignolo torrent, the Cima d'Asta massif, the Costazza - Castellazzo limestone-marly reliefs and the San Martino Dolomites (Sottovia, 2009).

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<sup>162</sup> [Original quotation] "qualora le zone speciali di conservazione ricadano all'interno di aree naturali protette, si applicano le misure di conservazione per queste previste dalla normativa vigente" (Decreto del Presidente della Repubblica n.357, 1997, as cited in Elia, 2013).

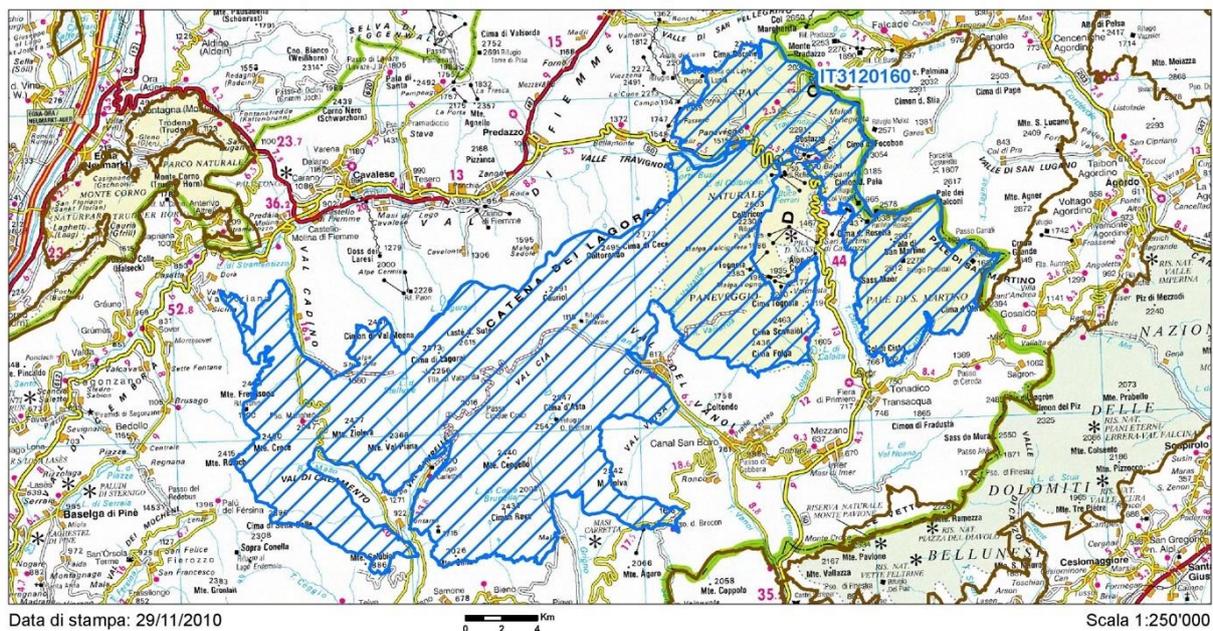


Figure 33: The SPA Lagorai, shown here in blue. As is evident from the map, the Lagorai SPA does not extend over the entire Mountain Range, but only over certain areas.<sup>163</sup>

However, the SPA Lagorai, although very extensive, unfortunately does not cover the entire Lagorai chain. On the contrary, it excludes most of the southern slope of the Fiemme Valley, part of the southern slope of the Travignolo Valley, almost half of the Vanoi area and the entire western section of the Lagorai (west of Valfloriana, Mount Rujoch and Mount Salubio). It is no coincidence that the Lagorai mountain range stretches over 80,000 hectares, while the SPA only covers around 46,000 hectares.

The SPA, therefore, remains so far an inadequate measure to guarantee the conservation of the environmental integrity of the Lagorai in its entirety, since it lacks a sufficient territorial extension. Furthermore, by their very nature, the sites of the Natura 2000 ecological network are not safeguarded through active protection mechanisms, but only through passive ones. By passive protection we mean here the environmental protection conducted by means of spatial planning provisions, prohibitions, and limitations, with the mandatory requirement that every new project or action planned within the area be subject to a special environmental impact assessment and approval procedure. The main issue with these forms of passive protection is that there is no authority constantly involved in the active maintenance of the area. Therefore, there is no institution in place to monitor the conservation status

<sup>163</sup> Map adapted by Enrico Carraro from Ministero dell'Ambiente e della Tutela del Territorio e del Mare (2010).

of the SPA, intervene locally to solve any potential issues, and work on a daily basis to improve the overall environmental health of the protected area.

Therefore, as with most European SPAs, SCIs, and SACs, the Lagorai SPA does not have a designated authority that deals exclusively with the management and constant maintenance of its protected area. On the contrary, there is a special office of the Autonomous Province of Trento, called *Ufficio biodiversità e Rete Natura 2000*<sup>164</sup>, that intervenes almost exclusively to assess the environmental impact and feasibility of any new building or agro-forestry interventions proposed for the area of the SPA. Assessments of the level of health of the protected areas are also performed much more rarely and loosely than in any proper protected area or park governed by a dedicated management authority.

Incidentally, the recent experience shows that environmental impact assessments for the Lagorai territory have often been performed in a manipulated and rather lenient manner. Consider, for example, the works carried out after 2018 as part of the so-called *Progetto TransLagorai*, where the promise of a rather substantial economic investment (3,6 million euro) for the maintenance and improvement of the Translagorai trail, a long-distance trek, was actually concealing invasive and ill-considered renovations of some local malghe. In total, as much as 3 out of the total 3.6 million euro invested was diverted to the refurbishment of 1 mountain refuge and 6 malghe, 2 of which were to be converted into restaurants. One of the projects, the one to transform Malga Lagorai into a malga-restaurant, has been - for now - stopped following the mobilisation of various citizens, environmentalists, journalists and politicians. The project for the renovation of Malga Valsolero in Val Calamento, on the other hand, has unfortunately been authorised and completed, and now the building stands as a huge empty chalet, which has nothing in common with the modest alpine architecture that is typical of the mountain huts and refuges of the Lagorai.

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<sup>164</sup> [Translated name] “Office for biodiversity and the Natura 2000 Network”.

### 4.2.2 The *Reti di Riserve*

The *Reti di Riserve*<sup>165</sup> network was first introduced in Trentino in 2007, under Provincial Law no. 11 *Governo del territorio forestale e montano, dei corsi d'acqua e delle aree protette*<sup>166</sup>; one of its main proponents was the then Provincial Assessor Mauro Gilmozzi. The idea behind the *Reti di Riserve* is an innovative management strategy for the protected areas which have already been established and are in force in the Trentino region. More specifically, management tasks and responsibilities are shared within local communities, thus involving public bodies, administrators, entrepreneurs, private citizens, and so forth. The purpose is to promote an interactive and integrated grassroots management of the nature reserves. Notably, the *Reti di Riserve* in Trentino are mainly clusters of relatively small nature reserves that share similar environmental features.

The *Rete di Riserve* is an innovative concept in the sense that it does not entail the establishment of a new protected area with restrictive constraints, but rather "an ecologically functional area identified on the basis of the ecological networks that are naturally present between natural ecosystems"<sup>167</sup> (Rete di Riserve Bondone, 2024). As a result of this pioneering approach, in 2017 the *Reti di Riserve* of Trentino were awarded by the European Parliament the European Charter for Sustainable Tourism in Protected Areas, a prestigious quality certification.

In the past, a *Rete di Riserve* was proposed for the Lagorai territory. Such a network was supposed to be established collectively by the various municipalities of the Fiemme Valley and of the Valsugana. In the end, however, the Lagorai reserve network was never instituted due to opposition of local councils, especially those from the Tesino area.

Today there are two other networks of nature reserves in the area, which however do not directly pertain to the Lagorai: the *Rete di Riserve Fiemme destra Avisio*, which is located on the opposite side of the Fiemme Valley with respect to the Lagorai, and the

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<sup>165</sup> [Translated name] "Networks of Nature reserves".

<sup>166</sup> [Translated title] "Government of the forest and mountain territory, watercourses and protected areas".

<sup>167</sup> [Original quotation] "un'area ecologicamente funzionale individuata sulla base delle reti ecologiche naturalmente presenti tra gli ecosistemi naturali" (Rete di Riserve Bondone, 2024).

*Rete di Riserve del Brenta*, situated near the Brenta river in Valsugana. The latter mainly concerns the areas on the valley floor of the Upper Valsugana. In 2023, however, both the municipalities of Scurelle and Telve became part of this network. As a result, in the near future there could be an extension of the *Rete di Riserve del Brenta* right into the Lagorai, along the Calamento Valley. Lastly, the part of the *Rete di Riserve della Valle di Cembra* that is situated on the downriver left bank of the Lower Avisio river and in the Valfloriana area also falls within the Lagorai territory. All these networks, however, only cover the most peripheral areas of the mountain range.

Furthermore, it is fair to point out that for the time being the Rete di Riserve only applies to rather small areas (between several hundred and a few thousand hectares). If it was ever introduced in the Lagorai, there would probably have to be several *Reti di Riserve* in order for such a large and complex territory to be properly managed.

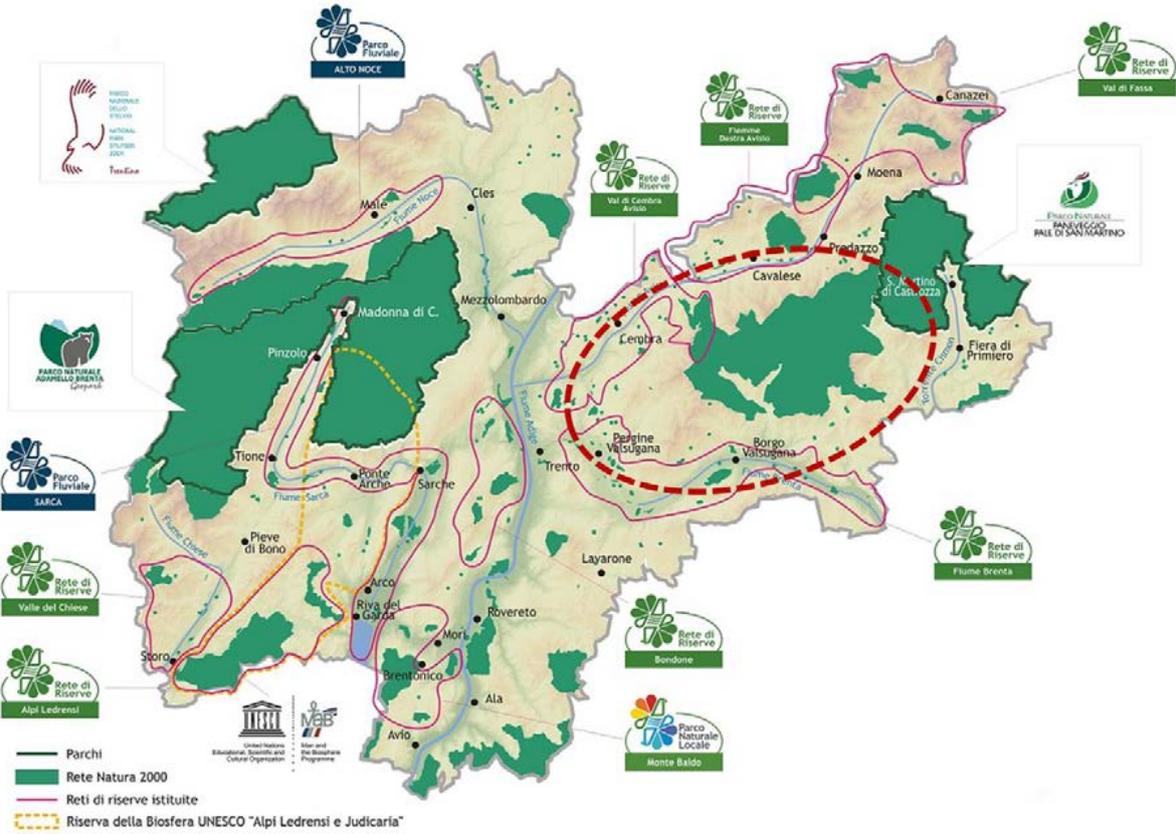


Figure 34: Map of the network *Reti di Riserve* of the Autonomous Province of Trento. As is clear from the map, the various *Reti di Riserve*, marked with a fuchsia perimeter, are only marginally present in the Lagorai area, here highlighted with a dashed red line.<sup>168</sup>

<sup>168</sup> Map adapted by Enrico Carraro from Provincia Autonoma di Trento, 2024.

### 4.2.3 The *Oasi WWF di Valtrigona*

The *Oasi WWF di Valtrigona*<sup>169</sup> is a small private nature reserve located in Valtrigona, between the Calamento Valley to the north and the Fregio Valley to the south, in the southern part of the Lagorai mountain range. The Oasi WWF Valtrigona is the only WWF oasis in the entire Alpine region to include high-altitude environments. It was first established in 1997, with the authorisation of the Autonomous Province of Trento and starting from an initial portion of 104 hectares that had been privately acquired by the WWF (Mayr, 2012).

The Oasis is currently spread over an area of approximately 234-236 hectares and is located within the perimeter of the Lagorai SPA (SPA IT3120160), in the municipality of Telve. It extends between an altitude of 1,600 and 2,200 metres; the highest points are Cima Pastronezze (2,182 m.s.l.) and Cima Agnelezza (2,234 m.s.l.), which are separated by Forcella Valtrigona (2,112 m.s.l.). The remarkable climatic variation occurring within the Oasis gives rise to a very rich flora and fauna, which includes the majority of the typical Alpine species (WWF, 2024).



Figure 35: Map of the *Oasi WWF di Valtrigona*.<sup>170</sup>

<sup>169</sup> [Translated name] “WWF Oasis of Valtrigona”.

<sup>170</sup> Map adapted by Enrico Carraro from [www.visitvalsugana.it](http://www.visitvalsugana.it)

In addition to active nature conservation, the Valtrigona Oasis staff is also engaged in frequent environmental education activities. For this purpose, field trips, guided tours and small exhibitions are organised in the Oasis. The involvement of children and young people is particularly significant in this sense.

Considering the outstanding example of conservation it constitutes and the quality of the educational and ecotourism services it provides, the Oasi WWF di Valtrigona is an excellent model showing how other areas of high naturalistic value within the Lagorai - and also beyond - could be effectively protected and enhanced, perhaps on a larger scale and with public investment.

#### **4.2.4 Ecomuseums**

There are nine Ecomuseums in Trentino, which are officially recognised by the Autonomous Province of Trento under Provincial Law no. 13 *Istituzione degli ecomusei per la valorizzazione della cultura e delle tradizioni locali*<sup>171</sup> of November 2000 (Provincia Autonoma di Trento - Assessorato alla Cultura, 2004). They are organised in a network, the *Rete degli Ecomusei del Trentino*<sup>172</sup>, which was established as part of the *Progetto Mondi Locali del Trentino*<sup>173</sup>. Unlike traditional museums, ecomuseums are not only located inside a building, but they also stretch outdoor over territories characterised by the presence of rich environmental, historical, ethnographic, and artistic heritage. Ecomuseums are therefore concerned with the protection, restoration, and promotion of local cultural and natural characteristics.

In the Lagorai mountain range (considered here in its full geological extension) there are five Ecomuseums: the Lagorai Ecomuseum, the Tesino Ecomuseum, the Valsugana Ecomuseum, the Vanoi Ecomuseum and the Argentario Ecomuseum.

Given their function of not only cultural but also environmental stewardship, the Ecomuseums may be considered an added value and possible allies in the overall commitment to the environmental conservation of the Lagorai.

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<sup>171</sup> [Translated title] "Establishment of Ecomuseums for the enhancement of local culture and traditions".

<sup>172</sup> [Translated name] "Trentino Network of Ecomuseums".

<sup>173</sup> [Translated name] "Trentino Local Worlds Project".

#### 4.2.5 Other local institutions involved in the cultural and environmental management of the Lagorai

There are also a number of other local institutions that are committed to the environmental and cultural preservation of the Lagorai territory.

Let us recall here the *Parco Miniere Lagorai*<sup>174</sup>, which offers an integrated network of thematic itineraries, exhibitions, and guided tours dedicated to the rich legacy of mining geosites of the Upper Valsugana, which ranges from Bronze Age to 1960s sites. Indeed, the intense mining activity is one of the most distinctive historical and ethnographic features of the western Lagorai territory.

There are also other local bodies involved in the promotion of the historical, artistic, cultural, and natural heritage of the various valleys of the Lagorai area. We would like to mention a few of them here, such as the *Istituto Culturale Mòcheno/Bersntoler Kulturinstitut*, the *Museo della Grande Guerra di Caoria*, the *Museo Etnografico del legno di Carzano*, the *Museo degli Usi e delle Tradizioni Telvate*, and the *Museo Pietra Viva*.

Finally, there are some small-scale museums, such as the *Sentiero dei vecchi mestieri* in Grumes, the *Casa dei Cintes* and the *Museo del Moleta* in Cinte Tesino, the *Museo di Nonno Gustavo* in Val Travignolo and the *Museo del Paracarro* in Canezza.

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<sup>174</sup> [Translated name] “Lagorai Mining Park”.

## **5. METHODOLOGY**

It is now necessary to explain the methodologies followed for the purposes of this thesis, i.e. for the bibliographical and archival research, the interviews, and finally also for the analyses conducted within the GIS geo-computational environment.

It is particularly relevant to clarify in which way and based on which criteria we selected the interviewees, collected and categorised the data, conducted the analyses, and ultimately created the final layouts and digital cartographic representations presented in this thesis.

### **5.1 Bibliographical and archival research**

First of all, bibliographical and archival research was used in this research thesis to reconstruct the geographical, geological, environmental, historical, archaeological, and cultural characteristics of the Lagorai territory.

To this end, various types of documents were used: books, academic publications, and articles, but also historical maps, conference proceedings, and a large number of newspaper articles. The latter, in particular, were of paramount value for the chronological reconstruction of the past park proposals and for the investigation of all the overexploitation attempts that have occurred in the Lagorai over the last few decades.

### **5.2 Interviews**

A key part of this thesis work are the interviews, which were conducted with participants selected on the basis of their specialised knowledge and direct experience of the Lagorai territory. Initially, a pool of 10 interviewees was planned, but eventually the number was reduced to nine because one interviewee did not answer the invitation.

The interviewees were selected according to the purposive sampling technique, also known as selective sampling. This is a form of non-probability sampling in which the

participants in interviews (or surveys, depending on need) are selected on the basis of the specific research objectives pursued by the interviewer. The benefit of purposive sampling, compared to convenience sampling, is that it allows to reach a specific pool of people, who are not chosen randomly but rather because of their special knowledge or experience in a certain field (Palinkas et al., 2015).

For this thesis, both male and female profiles were selected to be as diverse as possible, so as to cover all the different subjects and areas of expertise that are of significance for the understanding of the Lagorai landscape and environment. The interviewees included:

- an environmentalist and former forester living and working in the Lagorai territory (interviewee # 231111);
- a person in charge of one of the main ecomuseums in the Lagorai area (interviewee # 231117a);
- a university professor of archaeology and geoarchaeology, who is also a specialist in the field of archaeology of mountain landscapes (interviewee # 231117b);
- an Interpretive Nature Guide (*AIGAE*<sup>175</sup>) and organic farmer active in the Lagorai territory (interviewee # 231118a);
- the administrator of a protected area who is also an alpine guide (interviewee # 231118b);
- an elected representative of the people of one of the main Valley Communities of the Lagorai (interviewee # 231206);
- the manager of a *Rete di Riserve* close to the Lagorai territory (interviewee # 231209a);
- the manager of a mountain refuge in the Lagorai (interviewee # 231209b).

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<sup>175</sup> Acronym for *Associazione Italiana Guide Ambientali Escursionistiche*. [Translated name] "Italian Association of Nature and Walking Guides."

- a mountain refuge manager responsible for two Alpine huts, one of which in the Lagorai (interviewee # 231210);

A semi-structured approach was adopted for the interviews, as this is a data collection technique which allows the researcher to retain considerably more control over the progress of the colloquia than an unstructured interview, but which nevertheless also gives the interviewee the freedom to discuss various topics and thus engage in broad, personal conversations. Indeed, the semi-structured approach does not have the fixed constraint of structured interviews, which are normally based on questionnaires with closed or restricted written questions. The semi-structured interview is thus well suitable for both qualitative and quantitative data collection because it combines a series of open-ended questions established a priori with the possibility for the interviewees to address certain topics more in depth, by addressing additional subjects not presented in the original questions (Adams, 2015).

A qualitative research method was therefore primarily used to collect information and non-numerical data from the interviewees, although sometimes individual participants also provided some quantitative indications.

The interview approach was inspired by participatory action research (PAR), a method in which the researcher seeks to have an impact on social dynamics in order to facilitate the realisation of actions beneficial to the public interest. In this particular case, this would be the realisation of new conservation areas within the Lagorai, in order to better preserve its natural, historical, archaeological, and cultural heritage. Participatory action research prioritises the experimental knowledge of those directly involved in a certain topic in order to solve problems and find viable alternatives. It thus requires both awareness and action on the part of those people who are directly involved in the issues and who can provide new knowledge and alternative solutions. The research approach is therefore characterized by the collaboration between researchers and participants, who work together to identify solutions to pre-determined challenges. Participatory action research is context-specific in that it addresses the specific needs of one particular group and context, and also tries to foster democratic practices of public participation in processes of societal transformation (Cornish et al., 2023; Vaughn & Jacquez, 2020).

The interviews were conducted in a blended format: seven of them were carried out in person, while two more were conducted online. Participants were asked to sign a privacy and data use agreement, which they signed either in writing or verbally, while being recorded. The interviews were conducted in Italian since this is the native language of both the researcher and the interviewees.

The interview consisted of 6 main sections:

- a first phase in which participants were asked to envisage a specific and ideal intervention for the transformation of the Lagorai;
- a second phase, in which interviewees were asked to imagine an ideal future for Lagorai. This mental exercise was carried out by writing a short speech celebrating the transformation of Lagorai as if it had already been achieved;
- a third phase, aimed at identifying the most suitable means, resources and practices for the enhancement of the Lagorai mountain chain or at least of some of its areas;
- a fourth, more specific phase, in which interviewees were asked to indicate the area they deemed most significant and thus worthy of special attention and protection measures;
- a fifth phase, in which participants were consulted about the ecosystem services provided in the areas previously mentioned and their significance for the conservation of the Lagorai;
- a sixth and final phase to reflect on the complexities and hindrances hampering efforts to preserve, enhance, and re-qualify the Lagorai territory.

Respondents were asked the following questions in Italian:

- *Le propongo, per iniziare, l'esercizio mentale della "bacchetta magica". Le chiedo cioè di immaginare di poter trasformare il Lagorai in un senso a lei vicino e desiderabile (in ottica di tutela, protezione e valorizzazione del territorio). Quale singolo intervento apporterebbe qui e ora per raggiungere questa trasformazione?*

[Translation: I suggest we should start with the "magic wand" mental exercise. In other words, I ask you to imagine how you could transform the Lagorai in a desirable way (in terms of conservation, protection, and enhancement of its territory). Which individual action would you take here and now to achieve this transformation?]

- *Qual è il futuro ideale che immagina per il Lagorai? Per aiutarsi a visualizzarlo concretamente le chiedo di immaginare di essere nel 2073, alle prese con la stesura del discorso di celebrazione per l'avvenuta trasformazione del Lagorai. Quali elementi riporterebbe nel suo discorso? Quali successi vorrebbe vedere realizzati nei prossimi 50 anni? Le ricordo che l'esercizio riguarda una visione ideale, a prescindere dalla possibilità tangibile di realizzarla.*

[Translation: What is the ideal future you imagine for the Lagorai? To picture it better, I ask you to imagine that you are in 2073 and you are writing a speech to celebrate the accomplished transformation of Lagorai. What elements would you include in your speech? Which achievements would you like to witness over the next fifty years? Please remember that the whole exercise is actually about an ideal scenario, irrespective of its practical feasibility.]

- *Quali sono, secondo lei, i mezzi più adatti alla valorizzazione del Lagorai? A quali risorse umane, culturali e materiali ricorrerebbe per realizzare la sua visione futura di Lagorai?*

[Translation: In your opinion, what are the most appropriate means for the enhancement of the Lagorai? What human, cultural, and material resources would you employ to fulfil your vision of the Lagorai territory?]

- *All'interno del Lagorai esistono delle aree particolarmente significative da un punto di vista ambientale, naturalistico, storico ed emotivo, e dunque degne di particolare tutela? In quali di queste crede sarebbe bello proporre e attuare un progetto di valorizzazione del territorio simile a quello da lei appena proposto?*

[Translation: Are there any areas within the Lagorai that are particularly significant from an environmental, naturalistic, historical, and emotional point of view, and hence worthy of special safeguards? In which of these areas do you

believe it would be beneficial to propose and execute an enhancement project similar to what you have previously suggested?]

- *Le chiedo inoltre se le è noto il concetto di servizi ecosistemici. In caso non lo fosse, posso spiegarlo. Secondo lei, su quali servizi ecosistemici si dovrebbe puntare per un eventuale progetto di valorizzazione del patrimonio ambientale, storico e culturale del Lagorai?*

[Translation: I will now ask you if you are familiar with the concept of ecosystem services. In case you are not, I can explain it to you. In your opinion, which ecosystem services should be targeted when working on the enhancement of the environmental, historical, and cultural heritage of the Lagorai?]

- *Secondo lei, è possibile valorizzare e tutelare aree a bassa conflittualità (cioè considerate di scarso interesse poiché poco sviluppate, trascurate, peggio servite, meno turistiche, disagiati da raggiungere o sfruttare) facendo leva su alcuni servizi ecosistemici che in genere godono di poca considerazione? In che modo?*

[Translation: Do you believe it is possible to enhance and safeguard low-interest areas (i.e., areas that are deemed of little interest because they are underdeveloped, neglected, poorly supplied, less touristy, or difficult to reach and exploit) by relying on certain ecosystem services that are usually given little consideration? How?]

- *È possibile forse fare questo ragionamento anche in senso inverso, cioè agendo sulle zone il cui territorio è già ampiamente sfruttato, per far sì che cambi il paradigma di sviluppo e si raggiunga un migliore equilibrio tra uomo e natura?*

[Translation: Is it also possible to do this in the opposite way, namely, by intervening in overexploited areas in order to change

the development paradigm and attain an improved balance between people and nature?]

- *Quali ostacoli ritiene possano intralciare, ora o in futuro, il percorso di valorizzazione e tutela del Lagorai da lei proposto? Quali sono i limiti dei dispositivi di tutela attuali?*

[Translation: What obstacles do you think might stand in the way, either now or in the future, of the process of enhancement and conservation of the Lagorai that you have suggested? What are the limitations of current conservation measures?]

It is worth mentioning that when identifying the areas that are most significant and worthy of special protection, all interviewees were provided with a very basic map of the Lagorai area in order to help them pinpoint exactly the areas they wanted to indicate.

### **5.3 Ecosystem services**

Before delving into the working methodologies employed in categorizing the data collected during the interviews and in processing it through geographical analyses, it is necessary to briefly explain the concept of ecosystem services since it is at the core of the interviews and GIS analysis.

Ecosystem services were first popularized in the Millennium Ecosystem Assessment (MA), which was called for by the United in 2000 and finally published in 2005. Ecosystem services are usually defined as “the [direct and indirect] benefits people obtain from ecosystems” (Reid et al., 2005). Land ecosystem services, which are the ones we considered in this research thesis, are divided into four categories:

- *provisioning services* such as food and drink, natural medicines, materials, water supply, and renewable and non-renewable energy;

- *regulating services* such as air purification, carbon storage and climate regulation, flood management, erosion control, water purification, disease and natural pest control, and pollination;
- *cultural services* such as tourism, physical health and mental wellbeing, traditional systems of knowledge, information for cognitive development, recreation, sense of peace, inspiration, and spiritual and religious connection;
- *supporting services* such as healthy soil formation and maintenance, photosynthesis, nutrient cycling, habitat maintenance for wildlife.

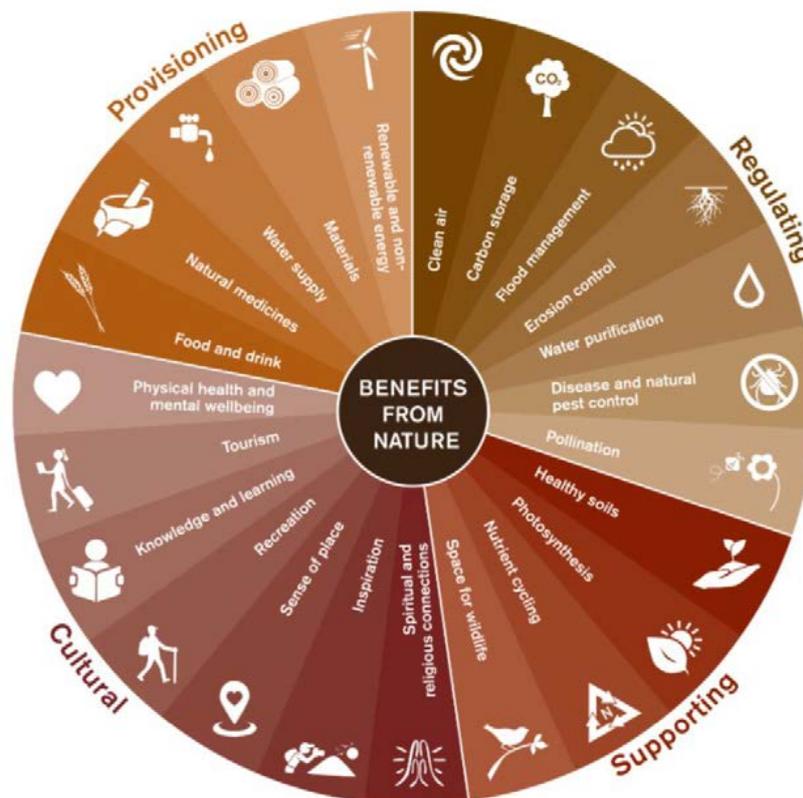


Figure 36: Ecosystem services presented in the *Ecosystem Land Wheel*.<sup>176</sup>

Ecosystem services “provide for human wellbeing and quality of life” and result in “benefits received by humans in the form of security, goods and materials, health and wellbeing” (NatureScot – NàdarAlba, 2023). The concept of ecosystem services simultaneously implies the idea that the environment should always be properly

<sup>176</sup> *Ecosystem Land Wheel* retrieved from NatureScot – NàdarAlba, 2023.

protected and maintained, so that nature can flourish and the provision of ecosystem services itself is not compromised.

## 5.4 Data classification and GIS analysis

To begin with, a Geographical Information System (GIS) - based project was created using the open-source software QGIS. The Coordinate Reference System (CRS) for the GIS data visualization and analyses was set to WGS 84 / UTM zone 32N (EPSG:32632).

Using high-resolution, natural-color virtual basemaps as reference (set on compatible CRS EPSG:3857, also referred to WGS84 datum), a number of digitized historical maps were then georeferenced in the project, including Sebastian Minsinger's 1849 *Geognostische Karte Tirols* (see Footnote 8), the 1:150.00 scale Kompass map used by WWF in 1993 to show the Lagorai area included within the Natural Park they had proposed (see Figure 31), and a cartographic representation of the WWF Oasis of Valtrigona retrieved from the website of the *Azienda per il Turismo Valsugana*<sup>177</sup>.

These maps were then used to determine the geological perimeter of the Lagorai mountain range and the Cima d'Asta and Rava mountain groups, the perimeter of the Lagorai Natural Park proposed by the WWF, and the perimeter of the *Oasi WWF di Valtrigona*.

Once the interviews had been successfully completed, polygons of all the different areas designated by the individual interviewees were also plotted in GIS, resulting in a total of 34 areas, some of which were coinciding with one another.

In addition, a section relative to eastern Trentino from a raster file with land cover classes was uploaded within the GIS project. We are referring here to the CORINE Land Cover 2018 (vector/raster 100 m), a pan-European land cover and land use inventory which is updated every six years (the last update was in 2018) by the Copernicus Land Monitoring Service of the European Space Agency.

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<sup>177</sup> [Translated name] "Valsugana Tourist Board".

In order to provide a higher resolution than that offered by CORINE Land Cover 2018, the categorical raster was downscaled from 100 to 10 m resolution. In addition, it was enriched with data on lakes and water reservoirs, including high-altitude lakelets, derived from the Sentinel-2 Global Land Cover Atlas (10 m resolution) raster. The Sentinel-2 Global Land Cover Atlas is another global map of land use/land cover (LULC) which is provided free of charge for scientific research purposes by the geographic information software company ESRI.

At this stage, the qualitative data emerging from the various interviews were analysed and normalised into an aggregated numerical record. In particular, with regard to the information provided by each interviewee on the ecosystem services most relevant to the Lagorai and the most appropriate means for the enhancement of its territory, it should be noted that this information was processed in two sequential phases.

Firstly, they were systematically compiled into a table presenting all the ecosystem services identified by the interviewees, reported by individual respondent. Then, on the basis of this first table, a matrix approach was applied to merge the information about the spatial distribution of land cover and land use classes and the potential capacity of each class to provide a certain ecosystem service. This method was inspired by the matrix-based evaluation approach by Campagne & Roche, 2018. The data was catalogued within a cross-referencing matrix, where the various classes of land cover present within the Lagorai geological area<sup>178</sup> were associated with the ranked potential to provide ecosystem services, as perceived by the interviewees. During this second phase, the importance attributed by interviewees to the various ecosystem services was standardized and ranked on the basis of the researcher's own expertise and of the data acquired during the extensive bibliographical research carried out for the initial chapters of the thesis.

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<sup>178</sup> Classes of land cover (CORINE Land Cover 2018 - vector/raster 100 m) that are present within the geological area of the Lagorai - Rava - Cima d'Asta: continuous urban fabric (111); discontinuous urban fabric (112); industry and commerce (121); mineral extraction sites (131); non-irrigated arable land (211); vineyards (221); fruit trees and berries (222); pastures (231); complex cultivation patterns (242); land principally occupied by agriculture, with significant areas of natural vegetation (243); broad-leaved forest (311); coniferous forest (312); mixed forest (313); natural grassland (321); moors and heathland (322); sclerophyllous vegetation (323); transitional woodlands (324); bare rock (332); sparsely vegetated areas (333); water courses (511); water bodies (512).

Once the data in the matrix had been normalised with an aggregated index ranging from 0 to 100, they were converted into a reclassification matrix. Simultaneously, the land cover/land use raster dataset was reclassified in QGIS, using the GRASS GIS *r.reclass* plugin. This resulted in a new raster for the Lagorai, reclassified on the basis of the ecosystem services scores assigned to the land cover classes occurring within the considered area

A total of 7 new areas perceived as worthy of special conservation efforts were identified within the Lagorai, selected on the basis of the most recurrent preferences of the interviewees.

It was then possible to use the layers of the newly identified common areas and the perimeter of the Lagorai Natural Park proposed by the WWF to cut the previously reclassified raster.

Finally, the zonal histogram QGIS processing tool was used to extract the frequency of all the unique values for each of the newly identified areas, for the polygon of the Lagorai Natural Park proposed by the WWF, and for that of the entire geological Lagorai - Rava - Cima d'Asta mountain range.

The results of the zonal histogram, which presents the values for the potential to provide ecosystem services in different areas, was ultimately rendered into charts and tables.

As explained more in detail in the chapter RESULTS, the research project resulted in a series of digital cartographic representations depicting:

- the individual areas identified by the interviewees;
- all the areas identified by the interviewees;
- a categorical map that highlights the potential capacity to provide the ecosystem services indicated as significant by the interviewees in the Lagorai geological area, in the Lagorai Natural Park proposed by the WWF, and in each of the 7 areas selected on the basis of the instructions of the participants to the interviews.

## **6. RESULTS**

In this chapter are presented the results of the interviews and GIS analyses carried out for this research thesis, i.e. the digital cartographic representations and data visualization that were produced following the indications of the interviewees and the data on land cover.

### **6.1 Interviews**

This section summarizes the results of the nine interviews that were conducted in order to collect a significant part of the qualitative data needed for this research thesis. The interviews all lasted between forty and seventy minutes and, as previously anticipated, mostly consisted of in-person meetings, apart from the two interviews with participants # 231206 and # 231209, which were held online.

#### **6.1.1 Targeted measures and preferred future scenarios for the conservation and enhancement of the Lagorai territory**

The first and second sections of the interviews, as anticipated in the Chapter METHODOLOGY, focused on the most desirable measures and interventions needed to enhance and protect the Lagorai territory, and then also on the ideal future scenarios imagined by all respondents for the mountain range.

Interviewee # 231111, an environmentalist and former forester in the Fiemme Valley, argued for the establishment of a Natural Park in the entire Lagorai - Rava - Cima d'Asta area, based on the park proposal already presented by WWF during the 1980s and 1990s. The interviewee therefore suggested that the issue of environmental and landscape conservation should be considered as a priority theme for the entire mountain range, and that such conservation should be integrated with the economic and social development of local communities. In order to do so, it would be necessary to update all the scientific research dating back to over 30 years ago, especially in light of the significant changes in the Lagorai environment caused by climate change. By

doing so, a new park could be established following expert guidance and according to the latest scientific discoveries.

Respondent # 231117b, a professor of archaeology, geoarchaeology, and archaeology of mountain landscapes at the University of Trento, shared a similar view. More specifically, he suggested that the entire Lagorai should be closed to private vehicular traffic and transformed not only into a natural park, but also into an archaeological and geological park (geopark). In other words, the proposed idea is a multi-thematic park, which should also promote the historical and geological values of the Lagorai territory, in addition to its natural features.

Respondent # 231210, manager of two mountain lodges, one of which is in the Lagorai, likewise suggested an action to protect the local environment, especially with respect to the native wildlife which is currently endangered by overhunting. In this regard, respondent # 231210 called for the creation of a national nature park reachable only by public transport, and equipped with well-maintained hiking trails and some small facilities for slow ecotourism. He also emphasized the need for a reasonable and sustainable restoration of historic buildings such as mountain huts, *malghe*, stables, and *casere*, which should then be allocated only for a small part to ecotourism, and for the rest to the traditional activities of animal husbandry and mountain agriculture. In addition, there should be an improvement in the management of water resources, which must not be excessively channelled and overexploited for the production of electricity.

Interviewee # 231118a, an Interpretive Nature Guide (*AIGAE*) and organic farmer living and working in the Lagorai territory, also emphasized the need to keep the Lagorai territory as intact and safe from mass tourism as possible, since its natural features are currently its biggest asset. To achieve such a goal, the respondent did not envisage the establishment of a proper nature park, but rather of a comprehensive protected area covering the entire mountain range. Ideally, this nature reserve could be a large conservation area in which sustainable sports and certain traditional and culturally meaningful activities such as small-scale pastoralism and animal husbandry would be permitted.

Also respondent # 231118b, manager of a protected area and mountain guide, stated that the Lagorai territory requires a more comprehensive and integrated vision in terms of its environmental conservation. With this in mind, # 231118b wishes for cooperation between all the Valley Communities and municipalities of the Lagorai, possibly through the establishment of a *Rete di Riserve* covering the entire mountain range. Indeed, a project for a natural park, although very positive, would probably be unwelcome to some local stakeholders.

On the other hand, there are those interviewees who do consider sustainability to be of great importance, but primarily as a key to tourism development. Respondent # 231117a, the manager of an ecomuseum in the Lagorai area, stressed the need for shared local governance, which could be achieved by organising recurring conferences and round table meetings involving local people and institutions. Such moments of dialogue would enable discussion and the consequent definition of shared strategies for sustainable tourism development in the Lagorai. More specifically, the interviewee highlighted the importance of capitalising on the most unique aspects of the Lagorai, i.e. its wilderness and the traditional high-altitude dairy farming. Such an approach would nurture new flows of ecotourism, geared towards care for the environment and environmentally-friendly sports.

Some other interviewees, on the other hand, declared that the Lagorai should be preserved in its current state. However, each of them gave a different meaning to this statement.

Interviewee # 231209a, manager of a *Rete di Riserve* close to the Lagorai territory, declared that there should be as little intervention on the territory as possible, so as to keep it as it is now and, if possible, go back and neutralise some negative projects that have been carried out in recent times, most notably for the unsustainable renovation of some *malghe*.

Respondent # 231209b, who is the manager of a mountain refuge in the Lagorai mountain range, also suggested that no major transformations should be done, since the beauty of the Lagorai lies precisely in its authenticity. # 231209b strongly recommended to preserve the local identity and traditional values, also by restricting the number of visitors so as not to further overload an area that is already at its limit in

terms of tourism pressure. Moreover, # 231209b suggested the establishment of some reservation-based public transport services in some valleys of the Lagorai, as well as an organised distribution of the number of tourists throughout the year.

Finally, interviewee # 231206, an elected representative for the Magnifica Comunità di Fiemme, also argued that the Lagorai should be preserved as it is today. However, # 231206 also believes that the Lagorai should not be regarded as a completely wild territory, such as the American wilderness, but rather as a man-made natural space. It is therefore important to maintain and financially support the local mountain farming and wood harvesting activities, which are instrumental in keeping the Lagorai environment in good health while also guaranteeing the economic prosperity of the communities living in the surrounding valleys. In addition, respondent # 231206 also called for more emphasis on certain ecosystem services that have so far been neglected, such as carbon dioxide sequestration.

### **6.1.2 Commemorative speeches for the successful enhancement of the Lagorai**

As previously mentioned in the Chapter METHODOLOGY, all interviewees were also asked to write a commemorative speech to celebrate the successful enhancement of the Lagorai area, as if they were actually in year 2073 and the Lagorai area had been improved in the exact way they had previously envisaged. Given that some of the respondents did not wish to write or deliver an actual speech, we will provide below the commemorative speeches prepared by some of them, followed by the main points otherwise expressed by the remaining interviewees.

#### **Commemorative speech by interviewee # 231111, environmentalist and former forester in the Fiemme Valley:**

*“We are gathered here together in Valtrigona, the very first WWF Oasis in Trentino, the area that inspired the establishment of the Lagorai-Cima d’Asta Natural Park. We are here to celebrate this great and unexpected success. The Communities from the Valsugana, the Fiemme Valley, and Primiero are fully involved in this project and proud*

*of their park, which has become an internationally recognised environmental reference point as a result of a series of studies and extensive research that have improved the natural values of the entire area. Once the park had been established and accepted, road traffic was prohibited to private cars in all of the park's valleys, except for landowners and members of the valley communities. The valleys are now only accessible using a public shuttle service. Ski areas have been downsized - but not abolished - and have been modified according to the restrictions imposed by climate change. Organic mountain farming has become the recognised trademark of all mountain pastures and food production activities in this area. Dozens of nature guide associations have been created and these work both in summer and winter. The Lagorai is now the beating heart of the three large areas that surround it - Primiero and Tesino, Fiemme, and Valsugana - , both from an economic and environmental point of view".*

**Commemorative speech by interviewee # 231117a, manager of an ecomuseum in the Lagorai area:**

*"We are gathered here today to celebrate the dawn of a new era for our Lagorai mountain range. Thanks to the support and cooperation of the entire Community, we have achieved such a remarkable level of development in our mountains that we have been able to enhance all the peculiarities that have always characterised our Communities. By thinking about appropriate ways to promote the naturalistic, historical, and ethnographic features of the area, we have been able to empower local communities and also develop a slow model of tourism that benefits the people living in the Lagorai area. We managed to fully involve the local population in the development process of the Lagorai. Passing on the love and attachment to the local territory and culture, and the commitment to a sustainable growth in the area where we all live, is the highest achievement earned in recent years by people, local administrations, and associations".*

**Commemorative speech by interviewee # 231117b, a professor of archaeology, geoarchaeology, and archaeology of mountain landscapes at the University of Trento:**

*“Ladies and gentlemen, we are here today to celebrate the 40th anniversary of the establishment of the Lagorai multithematic park. Forty years ago, on 17 November 2033, this new park was established by law by the Autonomous Province of Trento. As you will remember, the area was entirely closed to traffic, and a series of infrastructures were created to allow smooth movement within the park. In the initial stages of the project, these prohibitions caused a very serious crisis resulting in rather lively protests by a number of workers and business owners in the area.*

*However, in the medium term, as early as the late 1930s, we witnessed a gradual increase in the number of tourists who had identified the Lagorai as an immense area for recreation and entertainment. An area where it is possible to engage not only in extreme outdoor activities, but also in sports ranging from climbing to hiking, from paragliding to mountain-biking, and so on.*

*During the early 2040s, there was also a significant growth in new spaces specifically dedicated to welcoming these visitors by reiterating a model that had already proved successful in other areas, and thus also encouraging the permanent settlement of families coming from other parts of the Alps and Italy. These families decided to move to the Lagorai and revitalise the malghe and the baite, together with a whole series of traditional activities that were declining or experiencing a major slowdown.*

*As you may recall, in 2045 this led to the PDO recognition of the Lagorai smoked ricotta, which is now a highly renowned gastronomic product and one of the top local specialities - so much that today it is sold on a very large market.*

*We must not forget the major crisis that unfolded at the end of the 2050s, when an extreme meteorological event that had already occurred many years earlier in 2019 - under the name of Vaia Storm - partially destroyed several woodlands in the Lagorai. Some of these forested areas, incidentally, had already been replanted in 2022 and 2023, by replacing spruce with a variety of other species, in order to create not only monocultural but also more biodiverse forests. Unfortunately, as we all know, climate change has resulted in increasingly extreme weather events, something to which we have become grimly accustomed during the 20th century. The natural disaster of 2050,*

*when it happened, greatly impaired mobility throughout the entire mountain range, by destroying numerous forested mountainsides. Fortunately, these were rapidly restored thanks to a clever forestry policy implemented by the United States of Europe (as we know, Italy is no longer a country).*

*In short, we must admit that some decisions were quite difficult to take, but now, 40 years after the establishment of Lagorai Natural Park, we can finally enjoy an area which is envied by many in Europe, which attracts a lot of visitors, and that has become a true driver for sustainable economic development in the region”.*

**Commemorative speech by interviewee # 231118a, an interpretive nature guide and organic farmer in the Lagorai area:**

*“Fifty years ago, people made a huge effort to ensure that the Lagorai could become what it is today. We have managed to preserve this area from mass tourism: no new ski slopes or ski lifts have been built; no buildings have been erected at the risk of bringing urban life into the mountains. The ancient alpine pastures, at least the major ones, have been restored and are now productive during the warmer months of the year. This is also beneficial to dairy farming and the local production of typical cheese varieties. The wolf has also returned to the Lagorai, and this is extremely significant for the health of local ecosystems. We have also managed to educate livestock farmers to respect large carnivores, for example by offering them subsidies in the event of livestock loss. In this regard, the people living around the Lagorai area have been successfully educated on how to positively coexist and cope with large carnivores. All of the areas devastated by the Vaia storm and the bostrichidae beetle about fifty years ago have been successfully reforested. In some areas, however, the forest has recovered on its own, without any need for human intervention”.*

**Commemorative speech by interviewee # 231209a, manager of a Rete di Riserve in the Lagorai area:**

*“Fifty years after the official launch of the project for the enhancement of the Lagorai, I am happy to see that everything that was planned back then has been finally accomplished. The Lagorai, this fifty-kilometre-long mountain range, is one of the few*

*areas that has remained intact from an environmental point of view, with no invasive anthropic interference, especially at high altitudes. This seems to confirm the nickname that was given to the Lagorai in the 2020s: 'Little Nepal of Italy'. In the Lagorai mountain range it is possible to do some long-distance hikes surrounded by nature and undisturbed by ski lifts, high-altitude resorts, or busy mountain roads - except for the existing Manghen route.*

*The Lagorai is therefore a naturalistic and environmental heaven, which in the past fifty years has also provided significant economic benefits for the businesses located at lower altitudes and in the access areas to the mountain range. We have not yet managed to establish the Lagorai Natural Park, because there is not enough awareness to take such a big step forward; nevertheless, having the largest SPA area in the entire province and complying with its conservation guidelines has already made it possible to preserve an extremely high level of environmental health throughout the whole Lagorai mountain range".*

**Commemorative speech by interviewee # 231209b, manager of a mountain refuge in the Lagorai area:**

*"The most beautiful thing we have accomplished over the past years is having retained our identity and our local mountain culture. This includes the hospitality that is typical of our valleys, the short food supply chain, and the production of local cheese and of other homegrown products. One of our greatest achievements was letting people experience things that they cannot find at home, but only here in the mountains. It is a matter of making people realize that discomfort can sometimes be positive, and even result in being an added value. The Lagorai is a territory rich in flavours, food, nature, culture, and hospitality. It somewhat epitomises the philosophy of 'less is more'".*

The three remaining interviewees addressed the question without giving an actual speech. For this reason, we summarise their answers in the following list:

- **Respondent # 231118b**, a protected area manager and mountain guide, indicated as a priority for the future the preservation of the most significant and important locations in the mountain range, notably peat bogs and high-altitude

lakes. In addition, he stressed the importance of retaining some traditional and sustainable agro-forestry activities and discouraging any form of mass tourism. Instead, he advocated for ecotourism, mineralogical tourism, and sports that have no negative impacts on the environment, such as long-distance hiking and clean climbing;

- **Respondent # 231210**, a manager in charge of two mountain refuges, indicated the following points as his/her priorities: the establishment of a national park encompassing the entire Lagorai; the implementation of public transport lines to the Manghen Pass and some other inland areas, so as to avoid private vehicular traffic; the utmost protection of local fauna and the reduction of forest harvesting; and the restoration of historical buildings within the mountain range, primarily as a means to revitalise the traditional dairy farming industry. As a general rule, he called for greater balance between tourism, environmental protection, and traditional activities;
- On the contrary, **respondent # 231206**, an elected representative in the Fiemme Valley, stated that by 2073 some key goals would be highly desirable: the maintenance of traditional grazing practices at high altitudes, since they are a distinctive element of local culture; the continued use of timber as a source of income for the Valley communities, but with a new consideration for the role of woodlands as a means for carbon dioxide capture; the recognition of legal rights in the alpine areas, not only on an institutional level, but also for commons; the introduction of new types of crops on the valley floor, as a necessary adaptation strategy to global warming; and finally, the promotion of experience-based and more sustainable forms of tourism.

### **6.1.3 The most suitable means for to enhancement and safeguard of the Lagorai territory**

The third phase of the interview focused on the most appropriate means for the enhancement and conservation of the Lagorai area. Several interesting and complementary points emerged from this section of the interviews. They are here

presented in an aggregate manner, since almost all interviewees showed that they had a similar vision on this matter.

First and foremost, several respondents remarked the relevance of the different kinds of natural resources that are present within the Lagorai: forests and crystal-clear waters from mountain streams and lakes, as well as the great outdoors and the shared pastures that are fundamental for local traditional herding. These are the points emphasised by respondents # 231111, # 231117a, # 231206, # 231118a, and # 231209b.

Some other interviewees, on the other hand, chose to focus on the human resources and organisations that can contribute to the environmental conservation of the Lagorai. Several interviewees reported an increase in environmental awareness among the general public in recent years. For this reason, they stressed the importance of actively engage with people through public participation and bottom-up environmental governance. This idea is actually supported by recent studies, which show that the most effective approaches to environmental conservation and land management are indeed the collaborative and rights-based ones, “leveraging the wide range of formal (rules, organizations) and informal (values, worldviews, morals) institutional features that enable human–nature coexistence” (Foggin et al., 2021).

Dialogue with the public is thus regarded by several interviewees (# 231206, # 231117a, # 231117b, # 231118a, # 231118b, and # 231209a) as the most important tool to ensure uniform development and safeguard of the Lagorai. Public education on caring for the local natural heritage should also reach young people, e.g. through informative and motivational activities in schools. On the other hand, at the political level a major issue in the Lagorai seems to be the fragmented approach to local management and administration.

In this regard, some interviewees emphasised the important role of the different institutions that are already operating in the Lagorai area: not only the Autonomous Province of Trento, but also the valley Communities, the local municipal administrations, the environmental associations that are active at a local level (first and foremost the WWF), the SAT, the Reti di Riserve, the Ecomuseums, the local tourism

boards and the sector associations (# 231209a, # 231209b, # 231111, # 231210, # 231118a).

Finally, several respondents also highlighted the importance of slow tourism and ecotourism for the enhancement of the Lagorai and its natural heritage (# 231117a, # 231209b, # 231210, # 231118a, # 231118b, # 231209a). In a future perspective, some of them also envisaged the establishment of certain thresholds for human activities and for the number of tourists that are allowed to visit the Lagorai.

#### **6.1.4 Obstacles to the enhancement and conservation of the Lagorai**

Respondents were also asked to identify the main obstacles that could hinder the conservation and enhancement process of the Lagorai that they had previously suggested.

The greatest issue emerging from the interviews is first and foremost the wrong mindset of the general public and above all of local politicians. Respondent # 231209a, manager of a Rete di Riserve, complained that the majority of decision-makers who are responsible for the Lagorai territory are too narrow-minded. There is not enough foresight and long-term planning, and people tend instead to focus excessively on the short-term economic payback of their decisions.

Also respondent # 231118b, himself an administrator of a nature reserve, criticised the small-mindedness of most local and provincial politicians, who are full of prejudices and have a delusional idea of an "already perfect Trentino", which in reality does not exist. Under the excuse that Trentino is a prosperous territory and that its natural environment is not at risk, it often occurs that extremely damaging projects are approved. This tendency was also lamented by interviewee # 231117a.

According to another respondent, the environmentalist and former forester # 231111, the over-exploitation of the mountain territories is primarily associated with an old and outdated business model that is still prevalent in Trentino and which dates back to the 1960s and 1970s. Local entrepreneurs are incapable of reading the future and think

about sustainability. Nonetheless, they receive funding and support from local politicians. Similar remarks on this topic were also made by respondent # 231117b.

Respondent # 231118a, an interpretive nature guide and organic farmer, also condemned the poor attitude of the majority of people towards the natural environment. There is a need for more reverence for nature and its beauty, because all too often the prevalent mindset is still one of overexploitation and ransacking of the natural resources offered by the mountains.

Even # 231117b, an archaeologist, stated that a transformation should be promoted in the way the public engages with mountains and local people. The prevailing trend should not be mass tourism, which does not bring any added value to the territory, and on the contrary depletes its resources with little to no benefit for local communities.

On top of that, there is the localist mindset of many valley dwellers who are only concerned with their private interests. This is what was lamented by interviewee # 231210, manager of two mountain refuges, and respondent # 231117a, manager of an ecomuseum. The latter emphasized that this localist mindset also has a very negative influence on the development of ecotourism, particularly in the Valsugana area.

However, there are also those who believe that the major challenge for the future management of the Lagorai territory is represented by the depopulation of its valleys. This trend could result in the complete disappearance of some of those traditional agroforestry activities that have so far ensured human-nature equilibrium within the mountain range. Such is the standpoint advocated by # 231206, public representative in the Fiemme Valley. Therefore, in # 231206's view, for the future conservation of the natural environment of the Lagorai it will be sufficient to keep local communities and traditions intact.

Finally, respondent # 231209b, manager of a mountain refuge in the southern part of the Lagorai, identified some practical issues: the lack of public transport serving the Lagorai and some of its minor valleys, the absence of regulations regarding the number of tourists allowed in the mountain range, and the lack of water management policies, which will become increasingly crucial in the future, given the ongoing climate change.

### **6.1.5 The areas that are most worthy of further enhancement and conservation measures**

One of the key aspects of the interviews certainly involved the identification by all respondents of the areas they deemed most worthy of special protection measures.

Respondent # **231111**, an environmentalist and former forester in the Fiemme Valley, designated two areas that should receive special care:

- the entire Vanoi Valley, an area that has not yet been affected by mass tourism and that has several unique features, ranging from the abundance of fresh water to the integrity of forests and high-altitude pastures;
- the Valtrigona Valley, with the *Oasi WWF of Valtrigona*, because it represents an outstanding example of environmental conservation within the Lagorai and the whole Alps. The *Oasi WWF di Valtrigona* deserves more recognition and should serve as a driving force behind the environmental and cultural enhancement of the entire Val Calamento, in which it is located.

### Areas identified by interviewee # 231111 as most worthy of improved conservation measures

Enrico Carraro, 2024

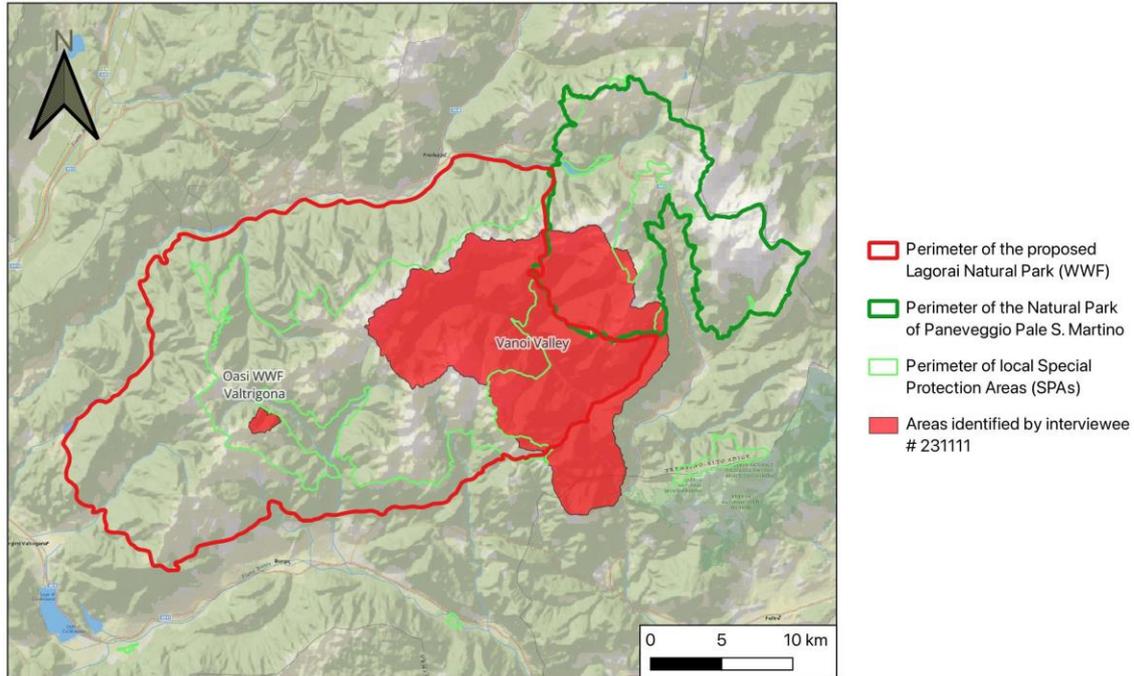


Figure 37: Map of the areas identified by interviewee # 231111.<sup>179</sup>

With regard to the environmental protection measures that are currently in force in the Lagorai mountain range, interviewee # 231111 stated that they are insufficient insofar as they are not enforced. Interviewee # 231111 suggested creating an integrated network of protected areas in the form of a Rete di Riserve covering the entire Lagorai, since this is an already existing conservation measure that has proven to be effective in the past. The establishment of a Rete di Riserve in the Lagorai would also allow for better land management, with a particular focus on forest health, new sustainable forestry practices, the rehabilitation of large pastures and natural grasslands, and the recovery of numerous *malghe*.

Interviewee # **231117a**, who is in charge of one of the main ecomuseums in the Lagorai territory, identified four areas that deserve special attention:

- the Vanoi Valley, a very promising area that is also home to the Vanoi Ecomuseum. The latter institution already does an excellent job in promoting

<sup>179</sup> Map by Enrico Carraro, 2024.

the cultural and environmental heritage of the Vanoi. In addition, the valley is suffering an economic crisis and depopulation, and this is yet another reason why it deserves special attention;

- the area covered by the Lagorai Ecomuseum, i.e. the entire Val Calamento and the tributary Val Campelle;
- the mountains overlooking Levico, from Monte Panarotta to Sette Selle, which have often been neglected in the past. This area is worthy of special conservation measures because of its unique landscape and its cultural and historical significance for the Upper Valsugana;
- the “Upper Lagorai” area, i.e. the rocky slopes and almost endless porphyritic scree of the north-eastern part of the Lagorai mountain range. This area faces north and is located between Cima Lastè delle Sute and the Lakes of Colbricon.

**Areas identified by interviewee # 231117a as most worthy of improved conservation measures**

Enrico Carraro, 2024

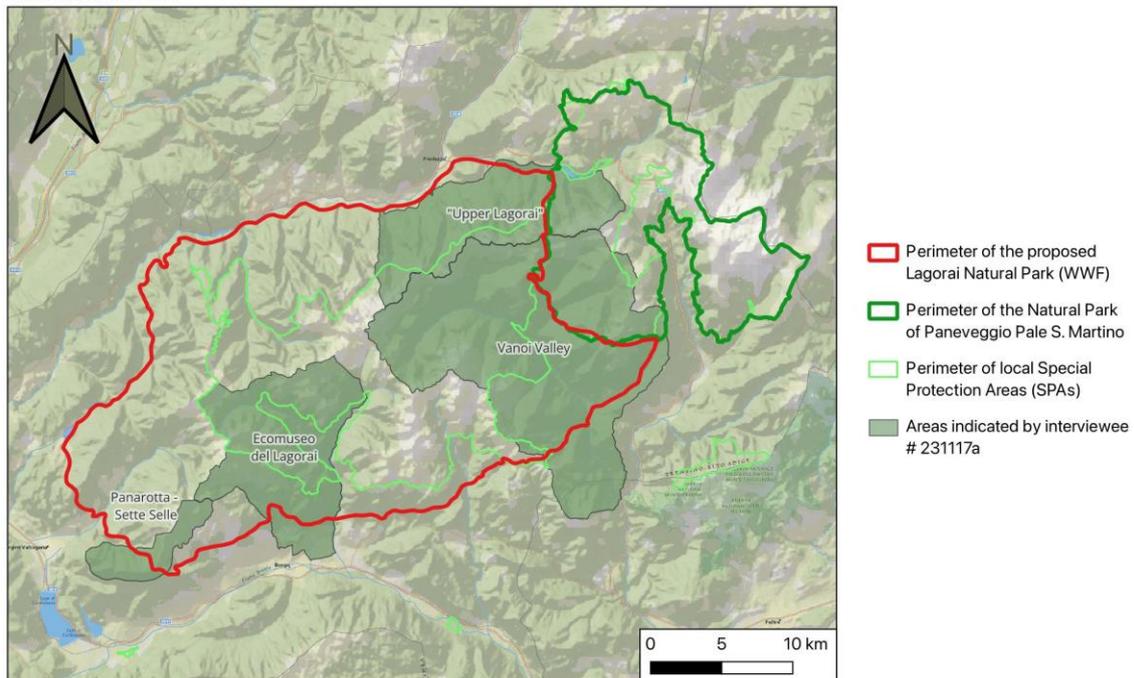


Figure 38: Map of the areas identified by interviewee # 231117a.<sup>180</sup>

<sup>180</sup> Map by Enrico Carraro, 2024.

With regard to the protection measures that are currently in force in the Lagorai, i.e. the sites of the Natura 2000 network, the interviewee # 231117a emphasised that they do have some very obvious limitations, as they lack effective enforcement and their existence is often unknown to the local population.

The interviewee # **231117b**, a university professor of archaeology and geoarchaeology who is also specialised in archaeology of mountain landscapes, listed ten areas that should be better protected:

- the area stretching from Rifugio Sette Selle to Monte Fravort, including the Lake Erdemolo and the basin south of Sasso Rosso and Sasso Rotto. This zone is rich in grasslands and it also boasts some relevant archaeological sites;
- the entire Val Campelle, which has not yet become a popular tourist destination and can thus still offer some remarkable environmental features;
- the Cima d'Asta massif, which is not only home to the most emblematic peak of the entire Lagorai territory, but also offers a peculiar environment, since it rises well above the other surrounding mountains, reaching a considerably high altitude despite being located in the southern part of the Alps;
- the area surrounding the Lakes of Colbricon, which is already encompassed by the Paneveggio Pale di San Martino Natural Park, but which nonetheless deserves greater recognition, mainly because of its extraordinary archaeological significance;
- the *Oasi WWF di Valtrigona*, as it is a protected area that deserves to be promoted because of the excellent conservation activities carried out within it by the WWF;
- the area surrounding Monte Rujoch;
- the area near Lake Lagorai and Malga Lagorai, which stretches up to the crest of the mountain range. Despite having a truly unique environment in terms of biodiversity and landscape, this area is in danger of being spoiled by the recent

renovation project proposed for Malga Lagorai, which is supposed to be converted into a restaurant;

- the northern mountainsides from Cima delle Stellune to Cima Ziolera, Lago delle Buse and Monte Pergol, as this is an area of great historical and archaeological value, due to the presence of human traces dating back to World War I, the Roman period, and the prehistoric times;
- finally, a predominantly rocky high-altitude area, referred to by the interviewee as 'Rocky Lagorai'. This area extends in a linear manner along the entire watershed dividing the Avisio and Brenta water basins, and then splits into two different mountain ridges to the west of Pala di Cagnon.

**Areas identified by interviewee # 231117b as most worthy of improved conservation measures**

Enrico Carraro, 2024

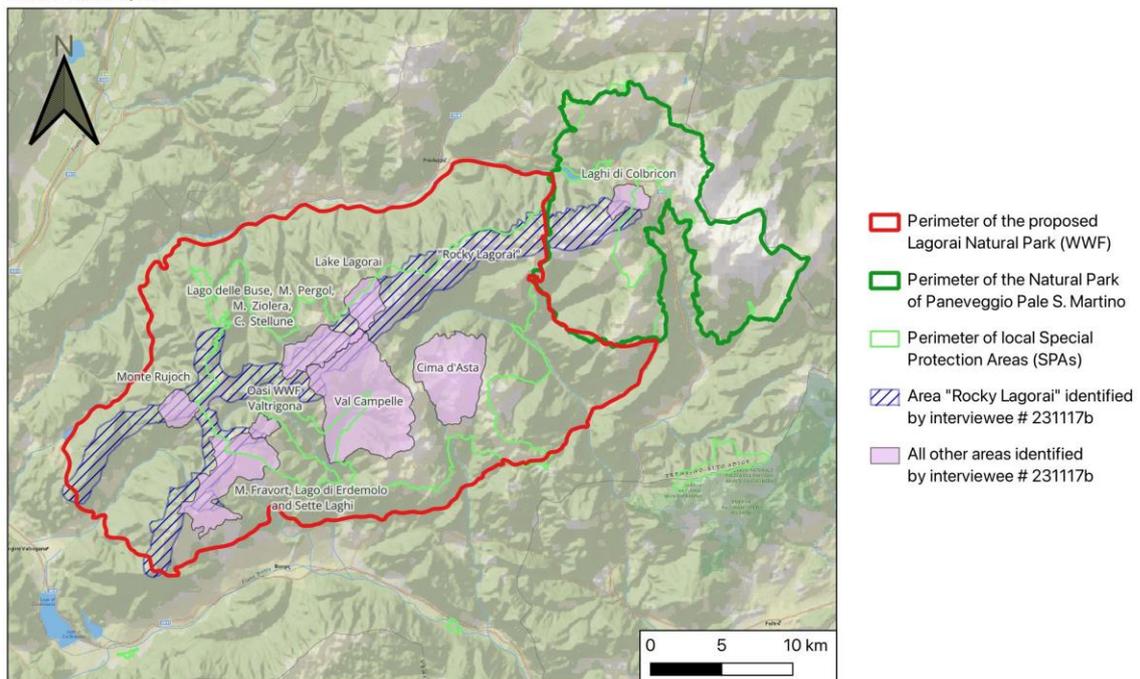


Figure 39: Map of the areas identified by interviewee # 231117b.<sup>181</sup>

With regard to the protection measures currently in force in the Lagorai, respondent # 231117b chose not to answer in detail, as he felt he was not knowledgeable enough about the rules governing them. However, as regards the archaeological heritage of

<sup>181</sup> Map by Enrico Carraro, 2024.

the Lagorai, archaeologist # 231117b stated that despite being adequately safeguarded, this asset is not promoted enough to the public.

Respondent # **231118a**, an Interpretive Nature Guide (*A/GAE*) and organic farmer working in the Lagorai territory, listed two areas that are small in size but of great naturalistic value, and therefore worthy of better environmental conservation measures:

- the area surrounding Lake Lagorai and the small Laghetti di Lagorai, in the Upper Cavelonte Valley. This is a very special location, characterized by the presence of a vast peat bog and of the major lake in the entire mountain range. This area is worthy of special conservation also in view of recent proposals to convert Malga Lagorai into a restaurant;
- the Buse di Malacarne area, which despite being part of the Paneveggio - Pale di San Martino Natural Park is still worthy of special consideration due to its unique high-altitude meadows and wetlands.

**Areas identified by interviewee # 231118a as most worthy of improved conservation measures**

Enrico Carraro, 2024

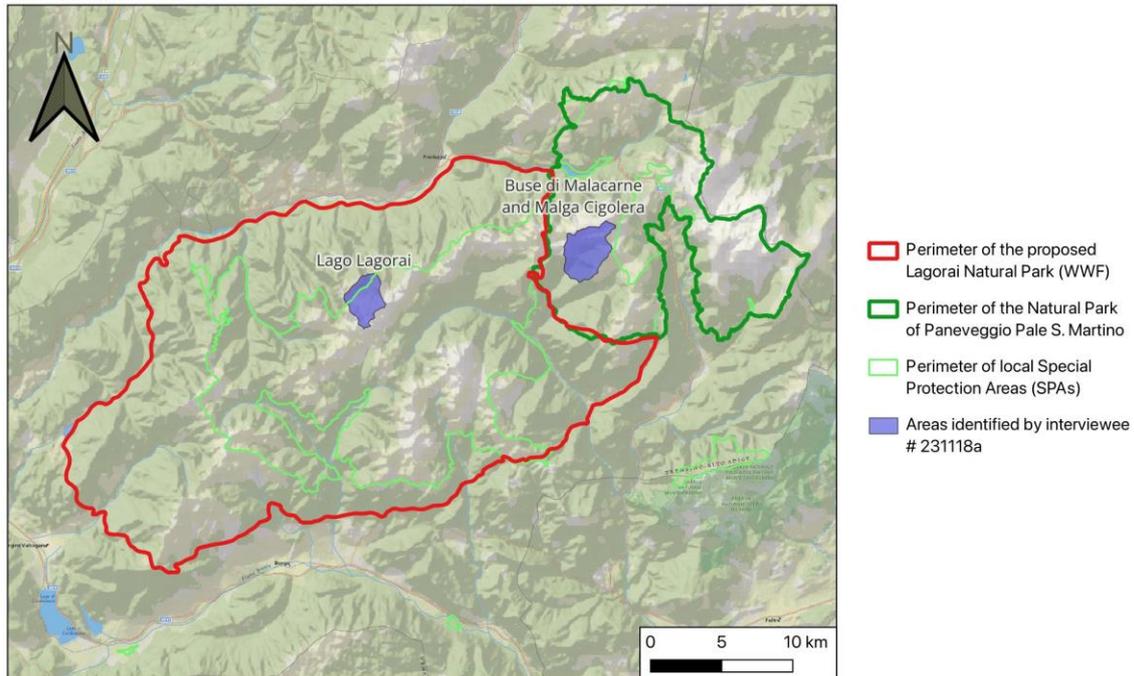


Figure 40: Map of the areas identified by interviewee # 231118a.<sup>182</sup>

With respect to the question on the main issues of the conservation measures currently in force in the Lagorai, respondent # 231118a too preferred not to answer.

Respondent # **231118b**, the manager of a protected area who also works as a mountain guide, listed no less than 9 areas worthy of improved protection measures:

- the area of the large prairies and pastures located between Sette Selle and Sette Laghi, which deserves protection not only due to its scenic landscape, but also because the area was intensively visited by prehistoric hunters;
- the northern slope of Cima d'Asta, from the valley floor to the ridges, including the Val Viosa, Val Regana and Lago del Bus. The area extends as south as the *Trodo dei Fiori* trail, near Passo del Brocon. This section of the Cima d'Asta massif is of great significance because it is quite pristine and scarcely populated, to the point that sometimes it can resemble a proper wilderness;

<sup>182</sup> Map by Enrico Carraro, 2024.

- the Valfloriana peat bogs, which have already been recognised as an SCI site;
- the area near Lake Lagorai and the neighbouring Lakelet of Bombasel, which has all too often been targeted by the ski industry and by a project finalised at turning Malga Lagorai into a restaurant;
- the wetlands near the Buse di Malacarne, even though they are already part of the Paneveggio Pale di San Martino Natural Park;
- the so-called “Corona del Lagorai”, located between Lago delle Stellune, Valsorda, Forcella Valsorda, Val Montalon, Cima delle Sute and Lago delle Buse. This is an important area from both an environmental and archaeological point of view, and it also forms a junction between all the major valleys surrounding the Lagorai;
- the Upper Moena Valley and the Forame Valley, both of which are remarkable in terms of their landscape and for the extensive presence of coniferous forests;
- the *Oasi WWF di Valtrigona*, a small but significant site that could serve as a model for the environmental conservation of other areas of the Lagorai;
- the area of the Rava mountains lying between the Rava Lakelets and the Malghe of Fierollo di Sopra and Fierollo di Sotto.

**Areas identified by interviewee # 231118b as most worthy of improved conservation measures**

Enrico Carraro, 2024

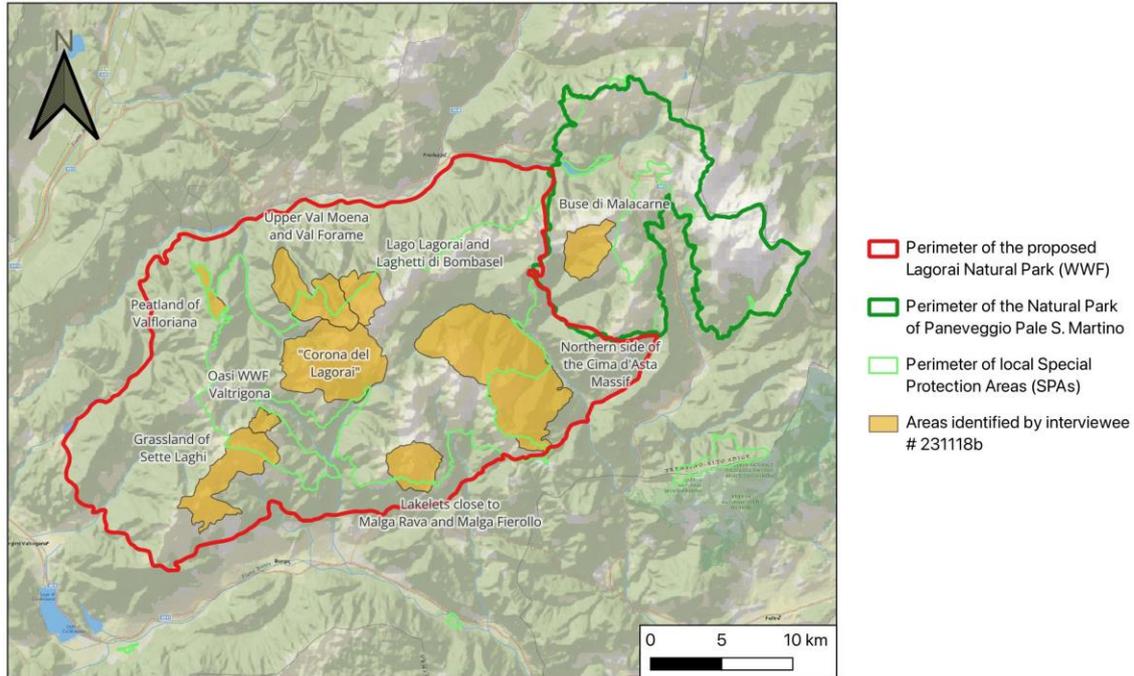


Figure 41: Map of the areas identified by interviewee # 231118b.<sup>183</sup>

With regard to the limitations of the protection measures currently in force in the Lagorai, respondent # 231118b stated that the SCI and SPA areas of the Lagorai somehow constitute positive environmental conservation measures, as they impose certain restrictions on land use and enforce some maintenance works in the area. However, it should not be forgotten that the Lagorai SPA was established very reluctantly and only after an infringement procedure. It is therefore no coincidence that it is located in the very area of the Lagorai where there are fewer alpine pastures and other exploitable terrains. Respondent # 231118b thus stated that instead of the complicated Natura 2000 sites, the establishment of a proper *Rete di Riserve* would be desirable. As a matter of fact, a *Rete di Riserve* is an active protection measure and for this very reason it can attract public funding which is vital for long-term conservation.

The interviewee # **231209a**, manager of a *Rete di Riserve* in the Lagorai area, indicated four areas worthy of improved safeguard measures:

<sup>183</sup> Map by Enrico Carraro, 2024.

- the area near Mount Panarotta, where there is a ski resort that has now been in deep crisis for a couple of years, and which should be converted to sustainable ecotourism;
- the *Oasi WWF di Valtrigona*, which despite covering a rather small area, is outstanding in terms of environmental conservation. The team working at the *Oasi* performs some valuable public education activities and has established peaceful arrangements with the local hunting associations. The area definitely deserves public funding, as right now it is only managed with the private resources provided by the WWF;
- Cima Socede, where an intervention has already been completed to restore a series of trenches and firing positions from World War I, and where the establishment of a larger open-air museum could be envisaged;
- the Caldenave Valley, which is one of the most beautiful and unique areas of the Lagorai. This valley is characterised by the presence of two wetlands, located one after another on two plateaus at different altitudes.

### Areas identified by interviewee # 231209a as most worthy of improved conservation measures

Enrico Carraro, 2024

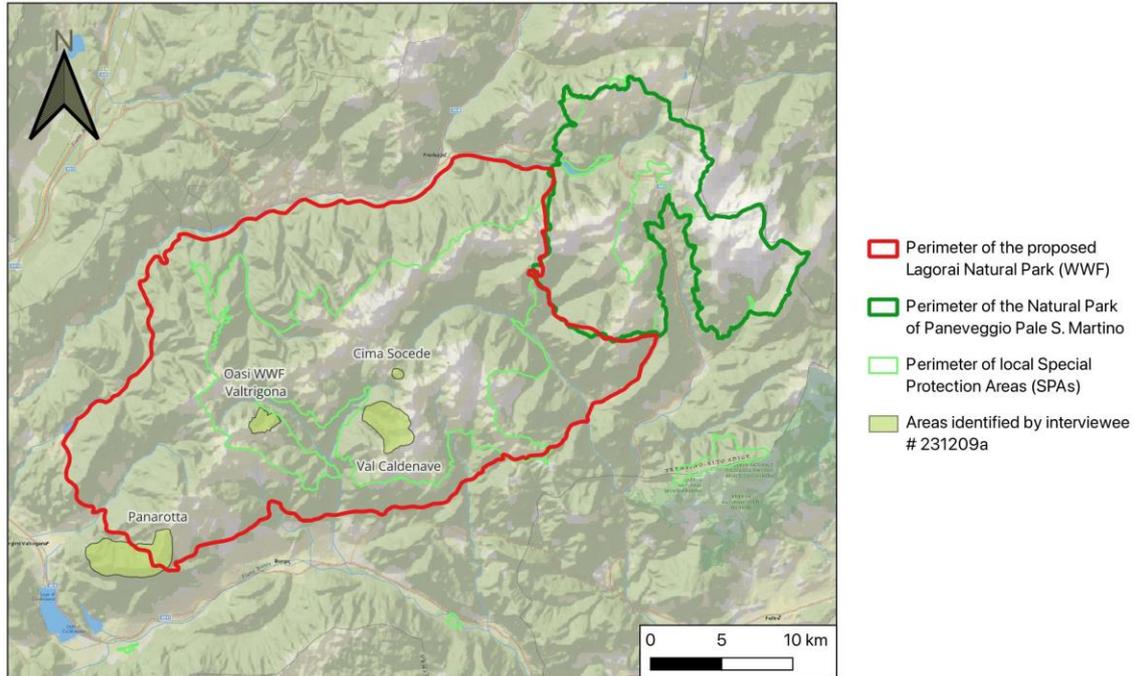


Figure 42: Map of the areas identified by interviewee # 231209a.<sup>184</sup>

As for the limitations of the conservation measures currently in force in the Lagorai, respondent # 231209a stated that the local SCI and SPA areas would be suitable for the conservation of the Lagorai territory, if the regulations they prescribe were actually observed and enforced. The main issue, however, is that SCI and SPA areas can only be managed passively. Moreover, there has already been profiteering in the past and this has led to the approval of damaging projects within the territory of the Lagorai Natura 2000 sites, such as those for the renovation of Malga Valsolero di Sopra in Val Calamento and Malga Cadinello.

The interviewee # 231210, manager of two mountain refuges, designated three areas that should receive special care:

- The Val Campelle area, with a particular focus on the private hunting preserve of Val Montalon. The latter area is still quite intact from an environmental point of view; however, some of its *malghe* and pastures are in ruins and this is also

<sup>184</sup> Map by Enrico Carraro, 2024.

due to the neglect of the Zuffa noble family, who owns the entire Montalon valley;

- the *Oasi WWF di Valtrigona*, which is an area of high naturalistic value;
- the area comprised of vast pastures and meadows upstream of Malga Trenca and Malga Colo, towards the Sette Laghi.

**Areas identified by interviewee # 231210 as most worthy of improved conservation measures**

Enrico Carraro, 2024

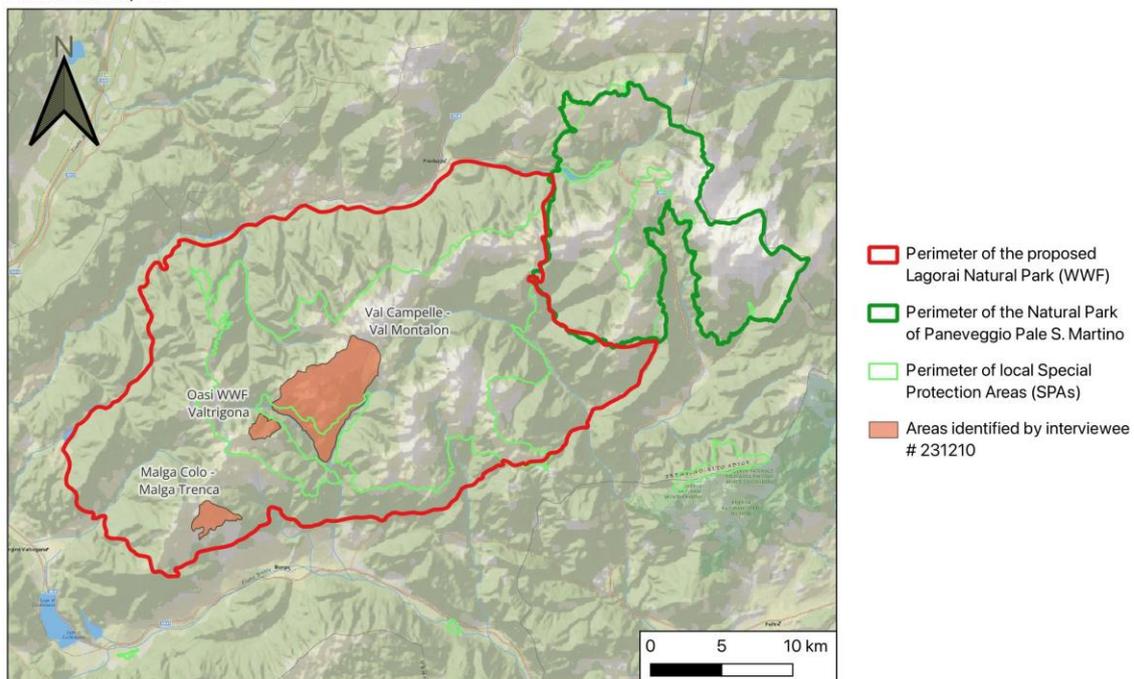


Figure 43: Map of the areas identified by interviewee # 231210.<sup>185</sup>

Concerning the limitations of the current protection measures in force in the Lagorai, interviewee # 231210 argued that at present they show obvious restrictions and that there should be a shift towards more advanced environmental conservation measures. More specifically, the establishment of a national park would be advisable, not only to safeguard the local environment, but also to encourage the further development of high-quality ecotourism. Moreover, a national park could also provide access to public funding which would be vital for the well-being of local communities and the continuation of traditional agriculture, livestock farming, and wood harvesting.

<sup>185</sup> Map by Enrico Carraro, 2024.

Finally, two of the interviewees refrained from indicating any priority areas for the conservation of the Lagorai, and they did so for different reasons:

- Respondent # **231209b**, manager of a mountain refuge in the Lagorai, stated that it would be better to protect the entire Lagorai mountain range rather than individual areas. According to # 231209b, safeguarding only certain areas of a mountain range poses a major risk, namely that the anthropic pressure relieved from the protected areas may be transferred to the other surrounding sections of the mountain range. This is exactly what has happened in the past in the Dolomites, which were declared a UNESCO World Heritage Site with the exception of the Sella Group and the Sassolungo. In these latter areas without protection, tourist infrastructure and ski areas grew disproportionately, with negative effects on the surrounding UNESCO mountains as well.
- On the other hand, respondent # **231206**, an elected representative in the Fiemme Valley, stated that the concept of “environmental protection of the Lagorai” is inherently wrong, because the continuation of traditional animal farming and logging is much more effective than limiting conservation measures in keeping the Lagorai territory as it should be.

Lastly, we present below all the areas mentioned by the interviewees. As can be inferred from the map, some of them are located within the perimeter of the Lagorai SPA, but many others fall outside this area.

## Areas identified by all interviewees as most worthy of special conservation measures

Enrico Carraro, 2024

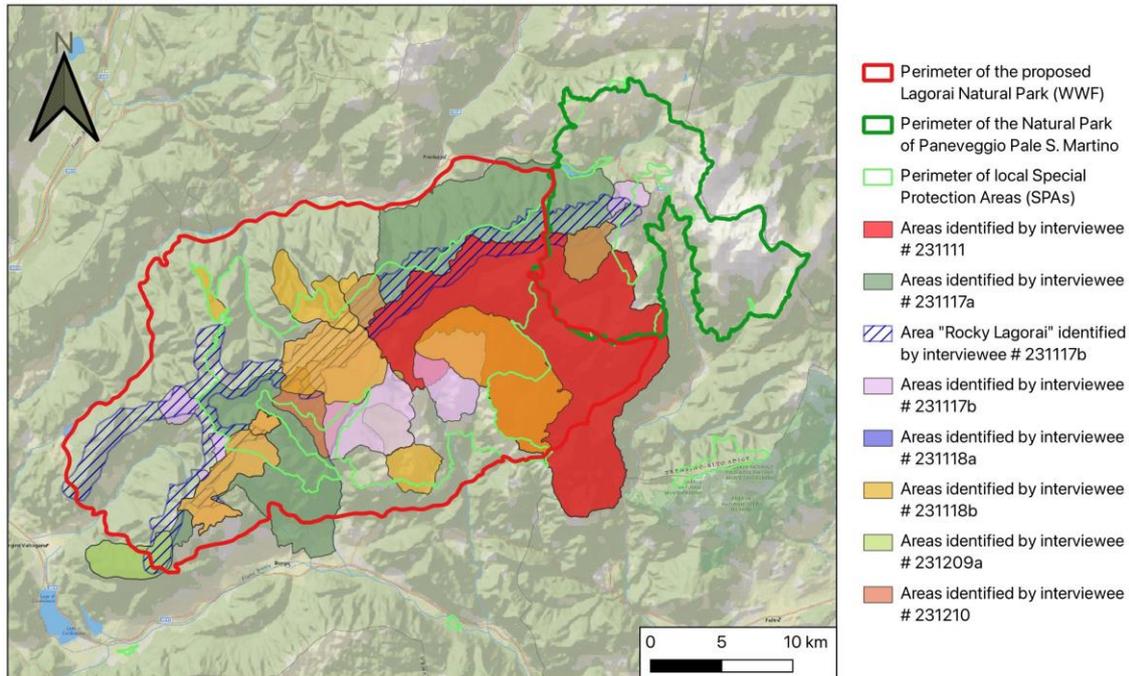


Figure 44: Map of the areas identified by all interviewees.<sup>186</sup>

### 6.1.6 Relevant ecosystem services for the conservation of the Lagorai mountain range

The interviewees were also asked which ecosystem services they felt were most important for the conservation and enhancement of the Lagorai territory. The data gathered during this phase of the interviews were then used to carry out analyses on the potential provision of ecosystem services in the areas identified by the interviewees.

The following pages provide a comprehensive presentation of the ecosystem services indicated as relevant by each respondent. The data are organised into four tables, one for each of the four categories that comprise the considered ecosystem services. It should be noted that if some ecosystem services appear as having been mentioned by some respondents and not by others, this does not necessarily mean that these

<sup>186</sup> Map by Enrico Carraro, 2024.

services are not deemed important by all interviewees. On the contrary, they may have been taken for granted or simply forgotten during the interviews.

PROVISIONING ECOSYSTEM SERVICES					
	RENEWABLE & NON-RENEWABLE ENERGY	MATERIALS	WATER SUPPLY	NATURAL MEDICINES	FOOD & DRINK
# 231111		Timber, but in limited quantities. Hay			Organic mountain farming, high-quality dairy farming
# 231117a		Hay, timber, pastures	Abundant water		Local products, high-quality dairy farming, traditional agriculture
# 231117b		Timber, high-quality hay, pastures	Water, but not from glaciers nor significant aquifers		Sustainable local farming, high-quality dairy farming
# 231118a		Timber, hay, pastures	Abundant water		Traditional agriculture and dairy farming
# 231118b	NO to impacting hydroelectric power plants, even if they are small	Timber, hay	Abundance of superficial water, but only little groundwater availability		High-quality dairy farming
# 231206	Hydroelectric energy, if beneficial for local communities	Timber, water			Agriculture, dairy farming, animal husbandry
# 231209a		Timber has lost much of its value after the Vaia disaster	Water reserves in the lakes of the Lagorai		Dairy products
# 231209b			Water (strongly influenced by climate change)		Dairy products and other specialties. Local agriculture both at low and high altitudes. Short food supply chain
# 231210	NO to hydroelectric power plants	Water	Abundance of water, that needs to be managed in a more sustainable manner		Mountain agriculture, apiculture, local dairy farming

Figure 45: Provisioning ecosystem services identified by the interviewees within the Lagorai mountain range.<sup>187</sup>

<sup>187</sup> Table by Enrico Carraro, 2024.

REGULATING ECOSYSTEM SERVICES							
	CLEAN AIR	CARBON STORAGE & CLIMATE REGULATION	FLOOD MANAGEMENT	EROSION CONTROL	WATER PURIFICATION	DISEASE & NATURAL PEST CONTROL	POLLINATION
# 231111			Maintenance of mountain slopes			Selective forestry, old-growth forests	
# 231117a	Clean air						
# 231117b		Peat bogs, marshlands, pastures, forests			Pure water		
# 231118a	Clean air						
# 231118b	Clean air	Peat bogs, marshlands		Woodlands to prevent land erosion	Pure water (and its maintenance)		Wild pollinators & apiculture
# 231206		Woodlands as an efficient way to store CO <sub>2</sub>		Protection of mountain slopes from landslides	Safeguard of freshwater springs		
# 231209a	Clean air	Mitigation of the effects of Climate Change and extreme weather events			Pure water throughout the whole Lagorai mountain range		Wild pollinators and apiculture
# 231209b	Clean air at high altitude				Pure water		
# 231210			Protection from floods, especially in a future perspective (climate change)	Prevention of erosion by excessive runoff			Wild pollinators and high-quality apiculture

Figure 46: Regulating ecosystem services identified by the interviewees within the Lagorai mountain range.<sup>188</sup>

<sup>188</sup> Table by Enrico Carraro, 2024.

CULTURAL ECOSYSTEM SERVICES								
	PHYSICAL HEALTH & MENTAL WELLBEING	TOURISM	TRADITIONAL SYSTEMS OF KNOWLEDGE & LEARNING	INFORMATION FOR COGNITIVE DEVELOPMENT	RECREATION	SENSE OF PEACE	INSPIRATION	RELIGIOUS CONNECTIONS
# 231111		Ecotourism, Eco-museums, open-air museums	Historical and archaeological values. Traditional agricultural and herding practices, traditional customs	Environmental education, also for young people and in schools	Sustainable sports	Areas with no noise pollution, old-growth forests		
# 231117a	Nature as beneficial for the body and mind	Ecotourism, slow tourism, <i>malghe</i> , thematic trails, ecomuseums	Historical, environmental, cultural, and ethnographic values	Environmental and cultural education, also for young people	Sustainable sports		Love and bond with the homeland	Philosophical considerations stimulated by natural landscapes
# 231117b		Slow tourism, cultural tourism, value of the <i>malghe</i>	Historical, archaeological, geological, environmental, cultural, and ethnographic values. Local languages	Public archaeology	Sustainable sports that require no infrastructures	No noise pollution, great outdoors, sense of peace		
# 231118a	Benefits for physical and mental health	Slow tourism and ecotourism	Traditional <i>malghe</i> and pastures. Resettlement in mountain areas		Trekking and some other sustainable sports	Sense of peace, connection with nature, silence		
# 231118b		Slow and sustainable tourism, ecotourism. Ecomuseums and other cultural institutions	Historical, archaeological, geological, mineralogical, environmental, cultural, and ethnographic values	Public education	Clean climbing and other sustainable sports	Silence, little light pollution		Man-nature relationship, life lessons coming from the natural world
# 231206		Slow and experiential tourism			Sustainable sports as well as traditional ski (no need for new ski resorts)		Inspiration stemming from local traditions (experiential tourism)	
# 231209a	Benefits for physical and mental health	Slow tourism and ecotourism. Ecomuseums. Environmental tourism, open-air museums	Environmental, historical, and archaeological values	Teaching programs, public education	Trekking, cycle tourism (limited to certain areas), other sustainable sports			
# 231209b		Ecotourism, public transport instead of private vehicles, fixed number of tourists	Local cultural identity. <i>Masi</i> and <i>malghe</i>	Education on local values and transmission of local traditional knowledge	Sustainable sports. Maintenance of pre-existing ski resorts	Silence, positive solitude, undisturbed nature	"Less is more" philosophy. Emotional value of natural landscapes	
# 231210		Slow tourism and ecotourism. Public transport. Ecomuseums and historical sites	Local identity and traditional mountain buildings ( <i>masi, malghe, stalle, casère</i> )	Public education and transmission of local traditional knowledge	Trekking and other sustainable sports			

Figure 47: Cultural ecosystem services identified by the interviewees within the Lagorai mountain range.<sup>189</sup>

<sup>189</sup> Table by Enrico Carraro, 2024.

SUPPORTING ECOSYSTEM SERVICES				
	HEALTHY SOILS	PRIMARY PRODUCTION & PHOTOSYNTHESIS	NUTRIENT CYCLING	LIFE CYCLES SUPPORT, BIODIVERSITY & HABITAT MAINTENANCE
# 231111	High-quality forests, old-growth forests, and pastures. Correct management of liquid manure		Old-growth forests, well-managed pastures	High levels of biodiversity and presence of astounding natural features. Presence of large carnivores
# 231117a	Organic agriculture in order not to contaminate the soil		Equilibrium of the nutrient cycle	Wild animals. Some areas of the Lagorai are still quite pristine
# 231117b	Stable geomorphology, mature soils, podsol		Soil rich in nutrients, abundance of superficial water	High quantity of natural elements, low anthropic pressure, few infrastructures
# 231118a				Some areas of the Lagorai are still quite pristine
# 231118b	Healthy soils at different altitudes	Photosynthesis	A balanced and well-functioning nutrient cycle	Presence of silent zones, of areas with no hunting pressure, old-growth forests
# 231206				No "wilderness", the mountain environment is not pristine and can only be maintained through traditional activities
# 231209a	Healthy soils throughout the mountain range	Photosynthesis		Vast natural areas, low human presence, sufficient environmental integrity
# 231209b				Vast natural areas with a high degree of environmental integrity and low anthropic pressure
# 231210			Correct management of pastures and woodlands to avoid alterations in the nutrient cycle	Vast natural areas for wildlife. Presence of large carnivores. Some areas are still quite pristine

Figure 48: Supporting ecosystem services identified by the interviewees within the Lagorai mountain range.<sup>190</sup>

## 6.2 GIS analysis of the relevant ecosystem services within the areas identified by the participants to the interviews

As already mentioned in the Chapter METHODOLOGY, in order to conduct the analyses on the potential capacity to provide ecosystem services relevant to the protection and enhancement of the Lagorai, 7 communal areas were identified. These are areas that were directly or indirectly indicated by more than one respondent, and that are sometimes comprised of two or more neighbouring areas suggested by single interviewees. Therefore, in outlining the external perimeter of these communal areas,

<sup>190</sup> Table by Enrico Carraro, 2024.

it was decided to also include those sites that may have been indicated by only one interviewee, but which nevertheless seemed likely to all fall under the same geographical context.

In addition to the 7 communal areas, an analysis of the potential provision of ecosystem services was also conducted for the area of the Lagorai Natural Park proposed by the WWF between the 1980s and 1990s, and for the entire area of the Lagorai - Rava - Cima d'Asta, considered here as a single geological district.

The results of the analyses are presented in the sections below.

### 6.2.1 Area of the Buse di Malacarne and Upper Val Zanchetta

#### Potential provision of ecosystem services in the area of the Buse di Malacarne and Upper Val Zanchetta

Enrico Carraro, 2024

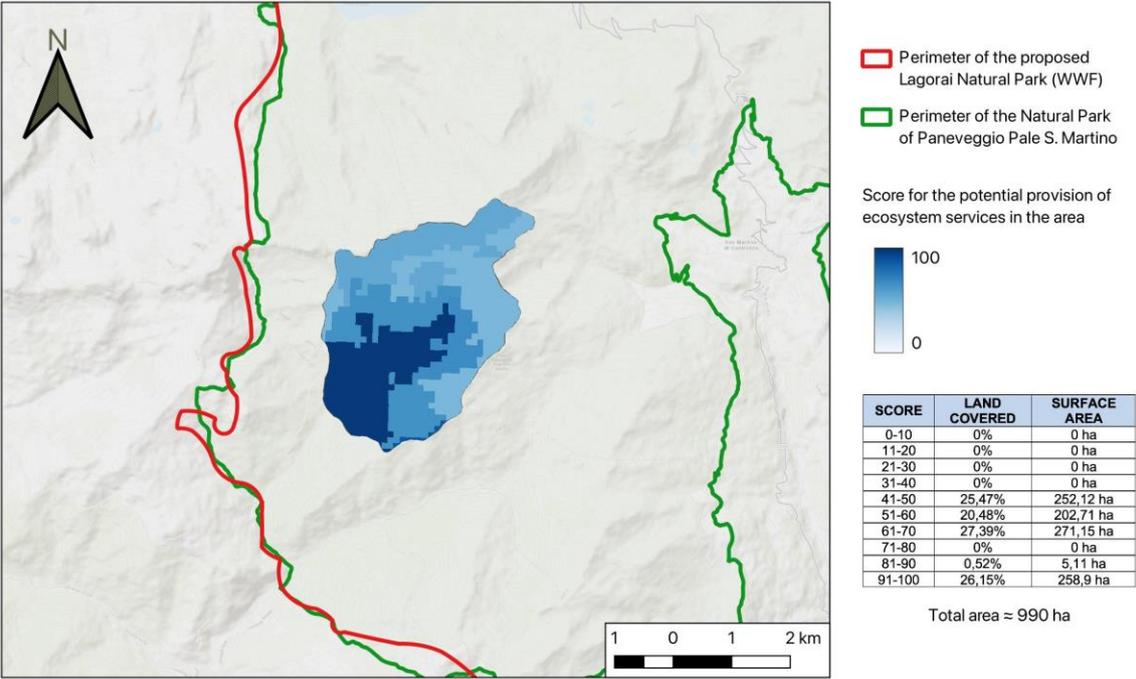
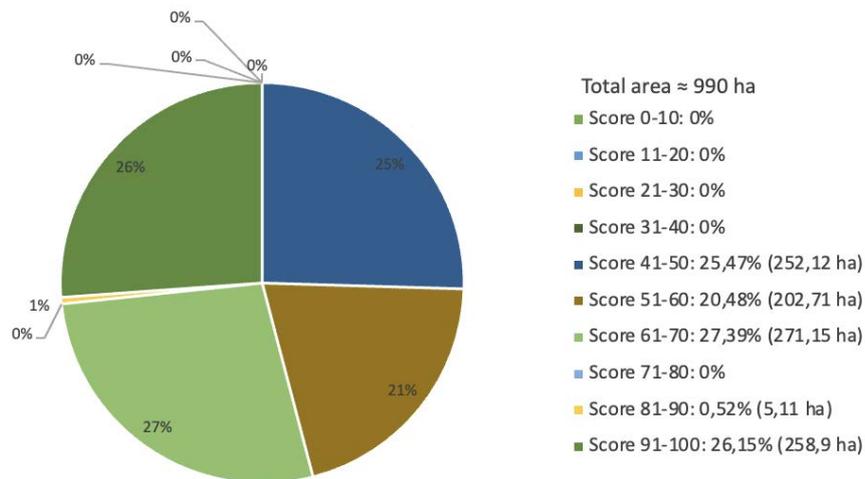


Figure 49: Map on the potential provision of ecosystem services in the area of the Buse di Malacarne and Upper Val Zanchetta.<sup>191</sup>

<sup>191</sup> Map by Enrico Carraro, 2024.



The area of the Buse di Malacarne and Upper Val Zanchetta was specifically indicated by two interviewees and included in the perimeter of larger areas by three other participants in the interviews. The Buse di Malacarne is a very significant wetland, that lies within the perimeter of the Paneveggio Pale di San Martino Natural Park and that has already been recognised as a *riserva locale*<sup>192</sup> to be managed by the Municipality of Canal San Bovo, under Provincial Law n° 5 (2008, May 27) *Approvazione del nuovo piano urbanistico provinciale*<sup>193</sup>. However, the latter was merely a formal recognition, and this is why some of the interviewees believe that the area is still worthy of a more targeted conservation and of active environmental management.

As can be inferred by looking at the map and table, more than 73% of the territory of the area is characterised by a type of land cover that offers a sufficient amount of ecosystem services (with a score between 41 and 70) that were deemed relevant by respondents, while almost 27% of its territory has an excellent capacity of providing such ecosystem services (with a score between 81 and 100).

<sup>192</sup> [Translated] “local reserve”.

<sup>193</sup> [Translated title] “Approval of the new Provincial Urban Plan (PUP)”.

## 6.2.2 Area of the Cima d'Asta massif

### Potential provision of ecosystem services in the area of the Cima d'Asta massif

Enrico Carraro, 2024

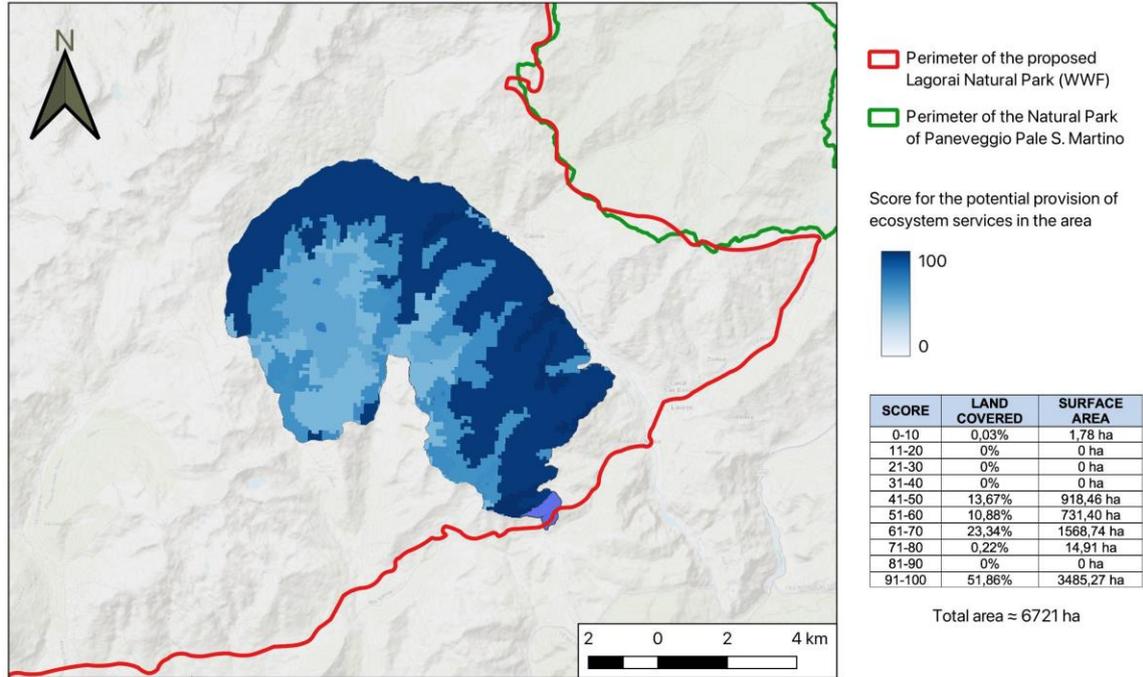
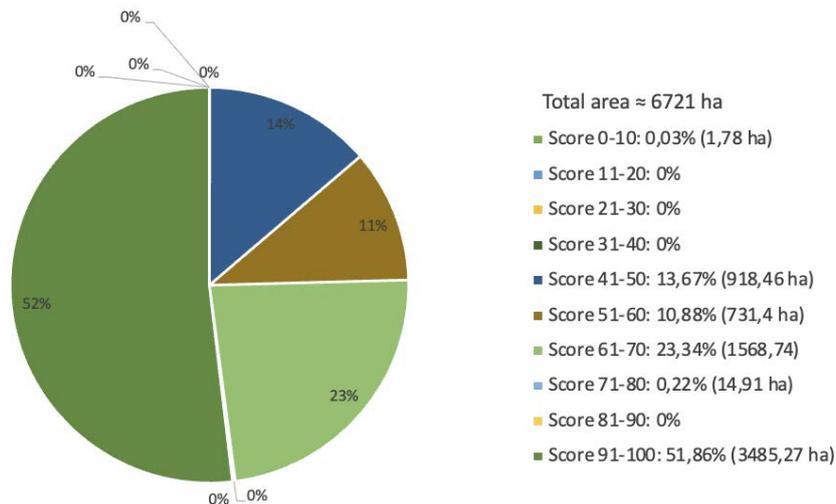


Figure 50: Map on the potential provision of ecosystem services in the area of the Cima d'Asta massif.<sup>194</sup>



The area of the Cima d'Asta massif was directly indicated by two interviewees and also included in larger areas by two other participants in the interviews. It is a very peculiar mountain area, not only because its summit is the highest peak in the Lagorai - Rava

<sup>194</sup> Map by Enrico Carraro, 2024.

- Cima d'Asta, but also because it stands as a granite rock outcrop in the middle of the porphyritic chain of the Lagorai. It is also important to note that the entire north-eastern section of the massif is covered by dense forests and grasslands that are almost untouched, and this is why the area can be regarded as the wildest section of the entire Lagorai. These observations are confirmed by the map and data reported in the table: almost 52% of the territory of the Cima d'Asta massif boasts an impressive provision of those ecosystem services (with a score between 91 and 100) that have been identified by the interviewees as significant for the protection and valorisation of the environmental and cultural heritage of the Lagorai. Moreover, another 37% of the area still provides significant amounts of ecosystem services (with a score ranging from 41 to 70).

### 6.2.3 Area of Lake Lagorai and Lake Bombasel

**Potential provision of ecosystem services in the area of Lake Lagorai and Lake Bombasel**

Enrico Carraro, 2024

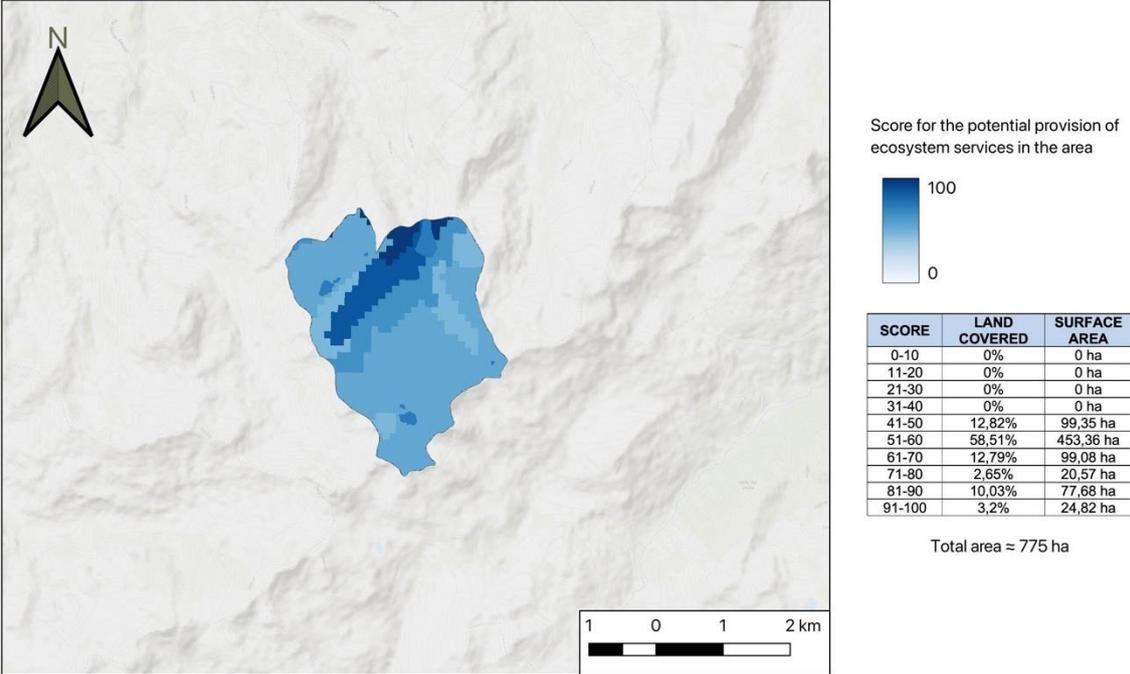
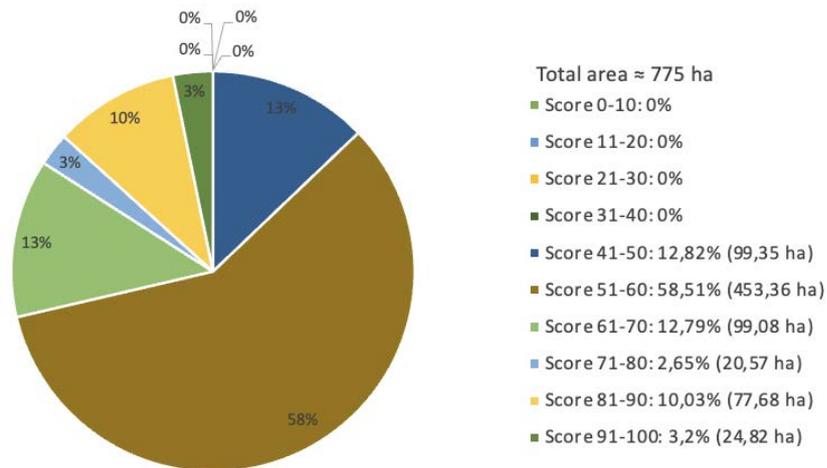


Figure 51: Map on the potential provision of ecosystem services in the area of Lake Lagorai and Lake Bombasel.<sup>195</sup>

<sup>195</sup> Map by Enrico Carraro, 2024.



The area of Lake Lagorai and Lake Bombasel was directly identified by three interviewees. This is one of the most iconic areas in the entire Lagorai due to the presence of the homonymous lake, which is the largest in the whole mountain range, and the very distinctive landscape surrounding it. In fact, upstream from the lake there is a large plateau that is in part marshland and in part grassland. At higher altitudes, on the other hand, there are rugged rocky slopes, in which the Laghetti di Bombasel and Laghetti di Lagorai are harmoniously nestled. Although to a lesser extent than the areas presented above, this territory is also capable of supplying a good amount of relevant ecosystem services, with almost 59% of the area having a score between 51 and 60 and around 13% of the territory showing values between 81 and 100.

## 6.2.4 Area of the Oasi WWF di Valtrigona

### Potential provision of ecosystem services in the area of the Oasi WWF di Valtrigona

Enrico Carraro, 2024

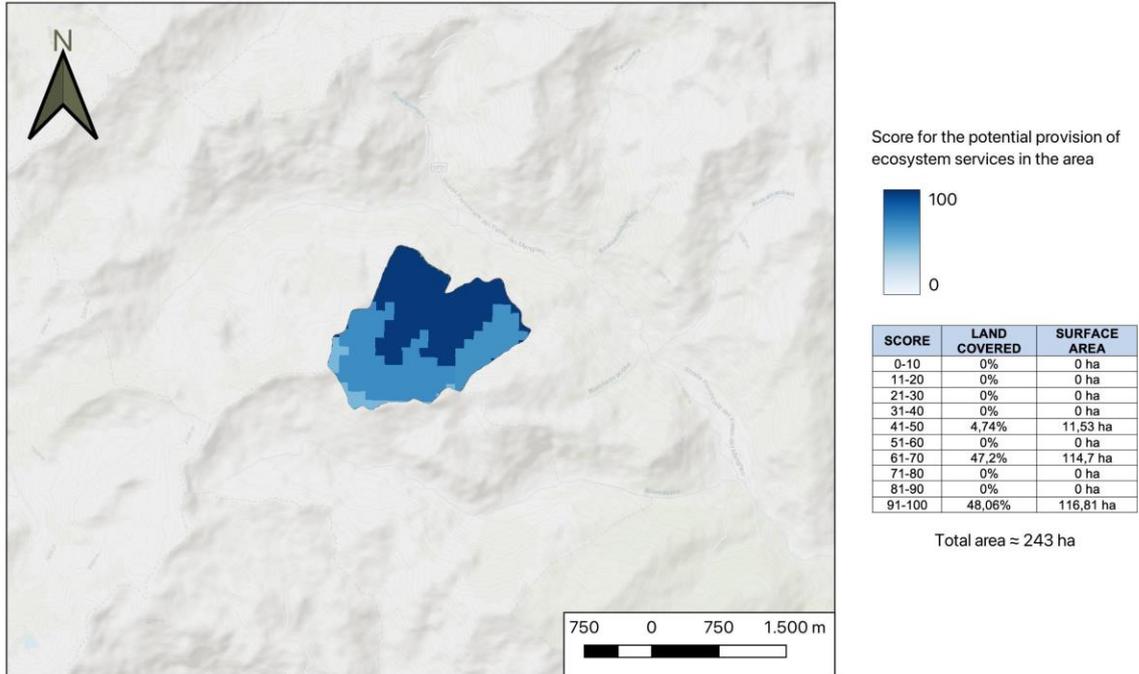
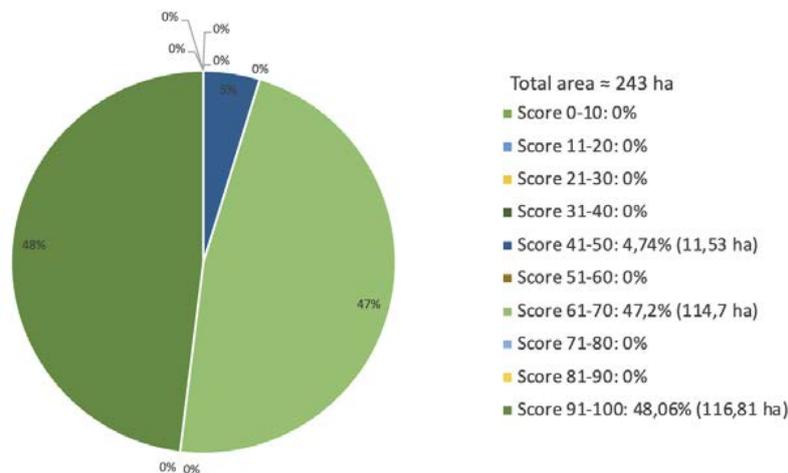


Figure 52: Map on the potential provision of ecosystem services in the area of the Oasi WWF di Valtrigona.<sup>196</sup>



The area of the *Oasi WWF di Valtrigona* was directly mentioned by five respondents and included in the perimeter of a larger area by another interviewee. Such popularity

<sup>196</sup> Map by Enrico Carraro, 2024.

appears to be well-founded: the area managed by the WWF offers an excellent supply of significant ecosystem services for the conservation of the local territory. More than 48% of its surface ranks in the highest score range, with values between 91 and 100, while the remaining 47% of the territory still obtains a very good score, ranking between 61 and 70. As is evident in the map, the zone providing the most ecosystem services is the one located at lower altitudes, where there are abundant coniferous and mixed forests. Moreover, recent analyses have revealed that some of the woodlands of the Valtrigona are characterised by the remarkable presence of old-growth forests.

### 6.2.5 Area of Monte Panarotta, Monte Fravort, and Sette Selle

**Potential provision of ecosystem services in the area of Monte Panarotta, Monte Fravort, and Sette Selle**

Enrico Carraro, 2024

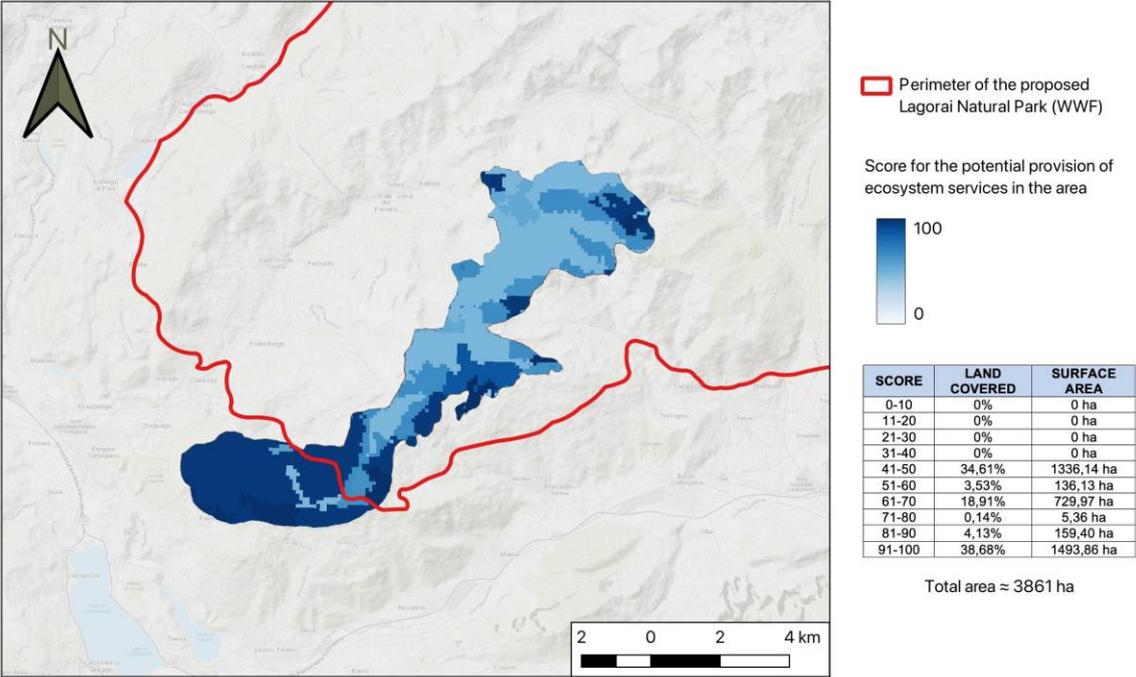
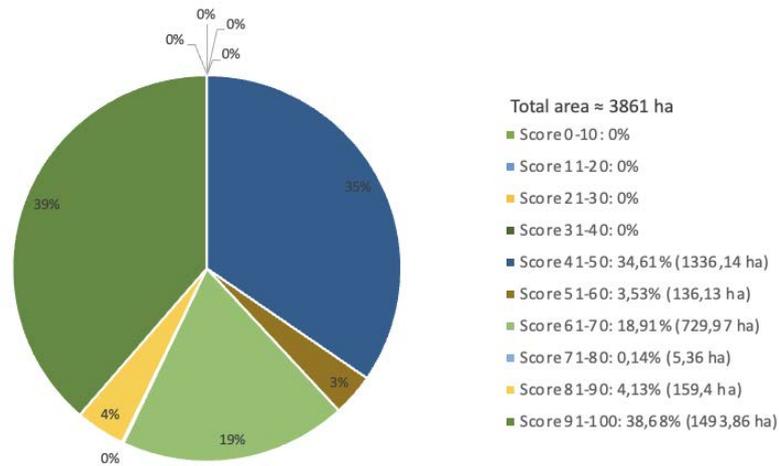


Figure 53: Map on the potential provision of ecosystem services in the area of Monte Panarotta, Monte Fravort, and Sette Selle.<sup>197</sup>

<sup>197</sup> Map by Enrico Carraro, 2024.



The area surrounding the Monte Panarotta, Monte Fravort and Sette Selle was precisely indicated by five respondents. This area is quite special, as it is characterised by the presence of both forested slopes, especially near the Panarotta, and vast grasslands, particularly in the Sette Selle area and upstream Malga Trenca and Malga Colo. Unsurprisingly, some people have referred to this area as 'Little Tibet', due to its vague resemblance to the Himalayan high plateaus. The potential provision of relevant ecosystem services within the area is generally good, but these are not distributed uniformly: they are most available near the Panarotta, despite the presence of a small and old ski area, while they have a slightly lower score in the Sette Selle area. However, this is most likely the result of the predominance of pastures, grasslands and rocky environments close to Sette Selle, as opposed to the presence of forests in Panarotta, which provide more valuable ecosystem services. Overall, almost 39% of the area achieves an excellent score for ecosystem services, with values ranging from 91 to 100. The rest of the territory ranks above the score 41.

## 6.2.6 Area of the Campelle and Montalon Valleys, the “Corona del Lagorai”, the Forame Valley, and the Upper Moena Valley

### Potential provision of ecosystem services in the area of the Campelle and Montalon Valleys, the “Corona del Lagorai”, the Forame Valley, and the Upper Moena Valley

Enrico Carraro, 2024

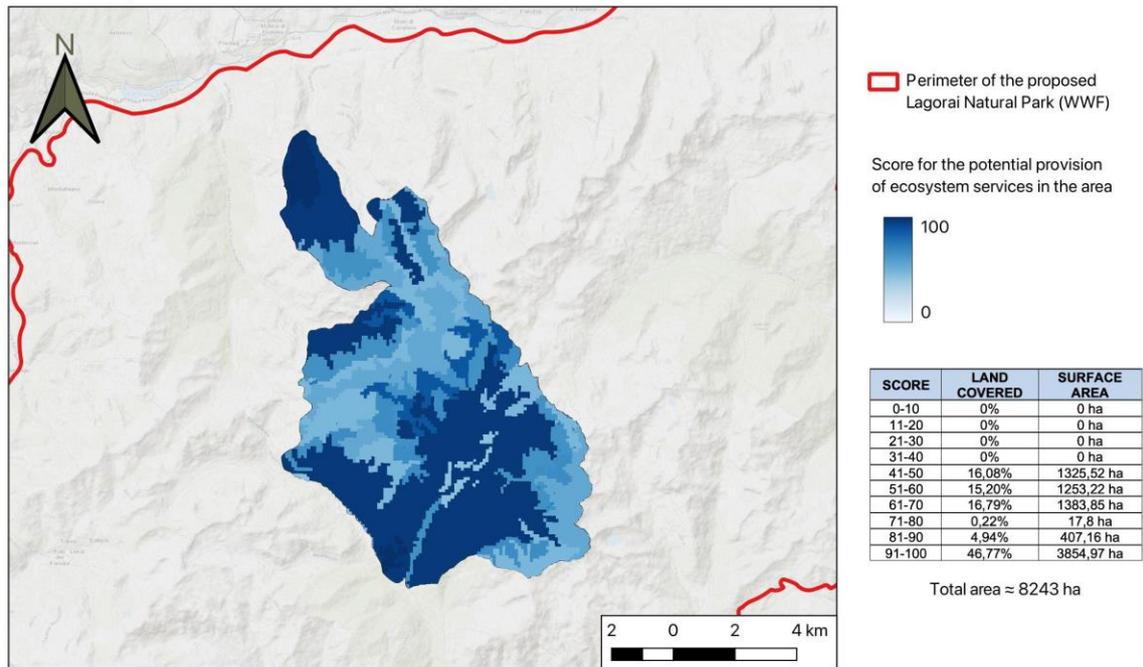
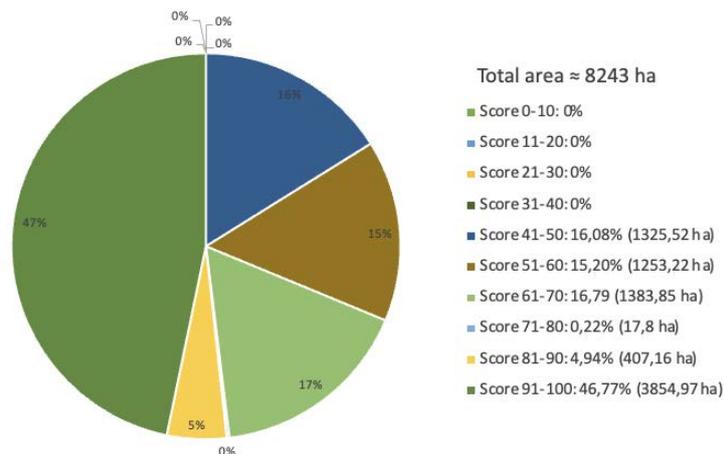


Figure 54: Map on the potential provision of ecosystem services in the area of the Campelle and Montalon Valleys, the "Corona del Lagorai", the Forame Valley, and the Upper Moena Valley.<sup>198</sup>



The area of the Campelle and Montalon Valleys, the “Corona del Lagorai”, the Forame Valley, and the Upper Moena Valley was traced by combining several contiguous areas

<sup>198</sup> Map by Enrico Carraro, 2024.

indicated by different interviewees. Taken together, this area was thus mentioned by five respondents. This is a fairly heterogeneous area, which extends from the Caldenave Valley in the south to the Forame and Moena Valleys in the north. It thus lies astride the watershed separating the northern and southern sides of the Lagorai mountain range. The location of the area is highly significant, as it includes the so-called “Corona del Lagorai”, i.e. the most central cluster of peaks and mountain passes of the Lagorai. The “Corona del Lagorai” serves as a sort of liaison point between all the larger valleys that penetrate the Lagorai.

This area features a high variety of natural landscapes, ranging from the lush coniferous forests of the Moena Valley, Forame Valley and Campelle Valley, to the high-altitude meadows near Lago delle Buse, Lago delle Stellune and Laghi delle Buse Basse. In addition, there are numerous historical and archaeological traces of great value. At Forcella Ziolera and Cima Valpiana are the remains of Austro-Hungarian hutments and trenches dating back to World War I, while at Lago delle Buse there are several archaeological traces of Mesolithic campsites. Moreover, the well-known Roman boundary inscription of Monte Pergol, which we have previously described, is also located in this area. As regards the potential provision of significant ecosystem services, more than 51% of the territory is covered by areas with an excellent capacity to provide such services (with a score between 81 and 100). The rest of the area shows values that never fall below 41.

## 6.2.7 Area of the Vanoi Valley

### Potential provision of ecosystem services in the area of the Vanoi Valley

Enrico Carraro, 2024

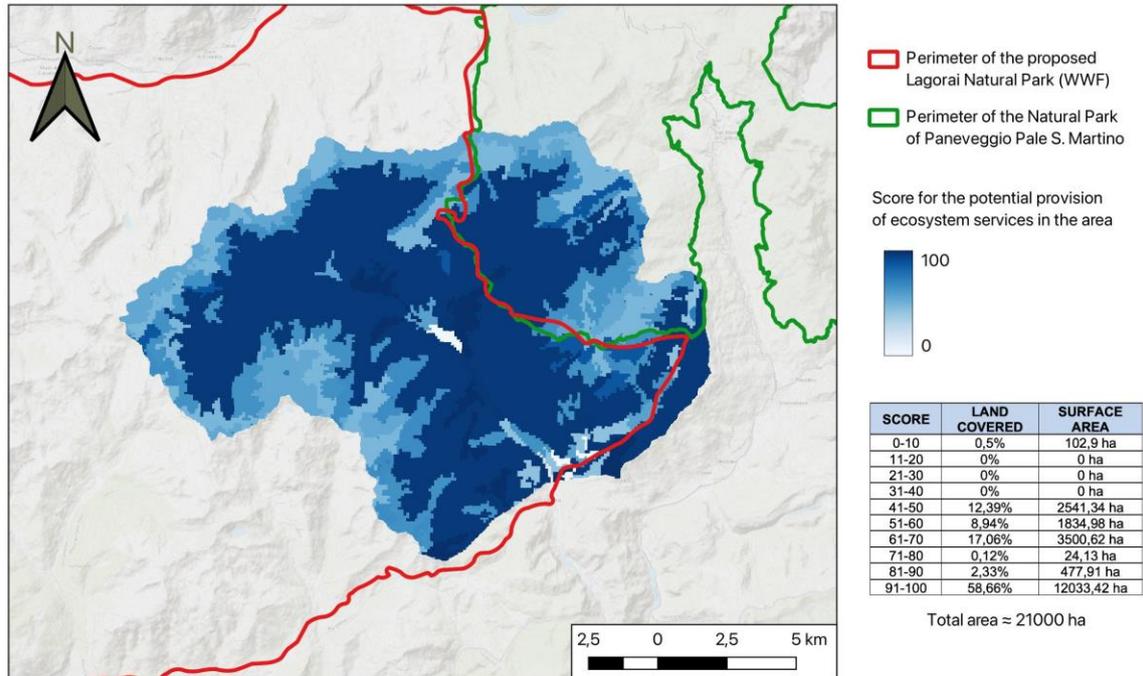
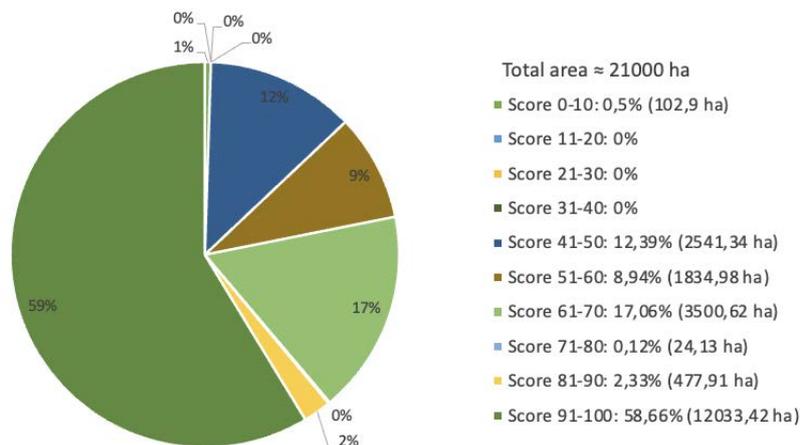


Figure 55: Map on the potential provision of ecosystem services in the area of the Vanoi Valley.<sup>199</sup>



The Vanoi Valley area was specifically indicated by only two interviewees, but some other areas which are included in its territory were also mentioned by three other interviewees. The Vanoi Valley is a rather unique territory, which despite including

<sup>199</sup> Map by Enrico Carraro, 2024.

some inhabited areas on the valley floor, still features some truly remarkable environmental attributes. As a matter of fact, the tributary valleys surrounding the main Vanoi Valley are largely uninhabited and covered by dense thickets and forests, as well as healthy pastures and grasslands. It is thus no coincidence that almost 59% of the Vanoi area obtains a score for ecosystem services ranging between 91 and 100. The rest of the territory still shows moderate and good scores ranging between 41 and 90. Only 0.5% of the area has a very low score (between 0 and 10) as regards the provision of significant ecosystem services. The reason why this small fraction of the valley offers so little ecosystem services that are relevant for environmental conservation is straightforward: this is the urban area at the bottom of the valley where the village of Caoria is located.

As can be observed in Figure 55, it was decided not to include the Val Cortella in this analysis, notwithstanding the fact that it is part of the Vanoi, since it is located between Veneto and Trentino and it represents a rather marginal area with respect to the zone traditionally occupied by the Vanoi Valley Community. In addition, despite having significant natural features, the Val Cortella is currently at the centre of a dispute between the Veneto Region, which would like to create a concrete dam and a large reservoir there, and the Autonomous Province of Trento together with the Province of Belluno, which are both firmly against such a destructive project. It is precisely for these reasons that the area appears to be extremely vulnerable and thus a dedicated study of the Val Cortella, considered as a separate area compared to the Vanoi, would be most advisable.

## 6.2.8 Area of the proposed Lagorai Natural Park

### Potential provision of ecosystem services in the area of the proposed Lagorai Natural Park

Enrico Carraro, 2024

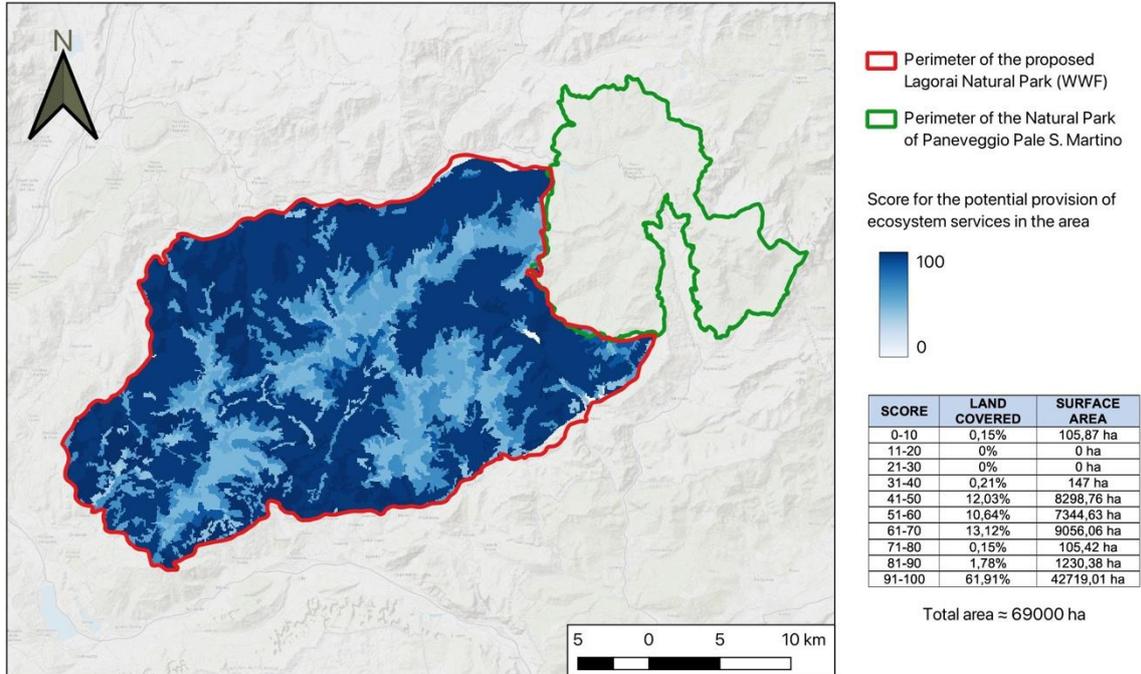
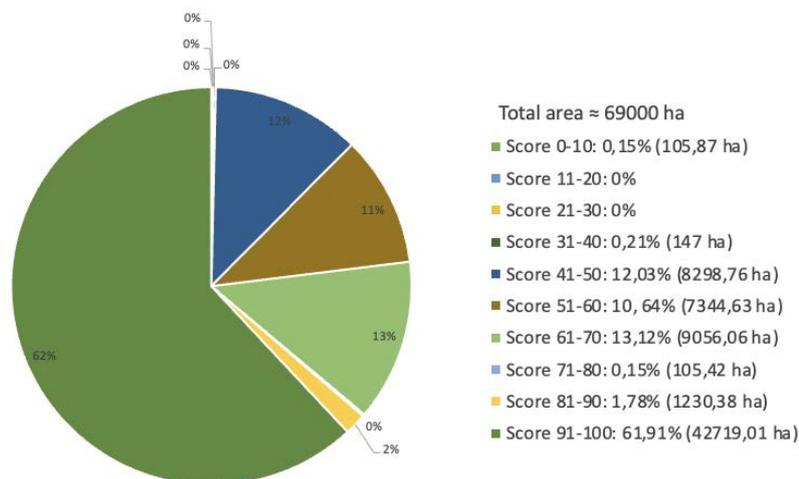


Figure 56: Map on the potential provision of ecosystem services in the area of the proposed Lagorai Natural Park.<sup>200</sup>



The area of the Lagorai National Park proposed by the WWF between the 1980s and 1990s covers an extremely diverse territory stretching over approximately 70000

<sup>200</sup> Map by Enrico Carraro, 2023.

hectares. The area extends from the Calamento Valley in the south to the Fiemme Valley in the north, and from the Vanoi Valley in the east to the Mòcheni Valley in the west. The analyses on the potential provision of ecosystem services seem to confirm the validity of the strategic selection operated by the WWF over thirty years ago when choosing the areas in which to establish the Lagorai Natural Park. Approximately 62% of the territory falling within the perimeter of the proposed park provides the highest possible potential supply (with a score between 91 and 100) of ecosystem services that are relevant for the conservation and enhancement of the environmental, historical, archaeological, geological and cultural heritage of the Lagorai. On the contrary, only 0,36% of the territory, which is a negligible portion, presents a low or very low score, ranging between 0 and 40.

## 6.2.9 Geological area of the Lagorai - Rava - Cima d'Asta mountain range

### Potential provision of ecosystem services in the geological area of the Lagorai - Rava - Cima d'Asta mountain range

Enrico Carraro, 2024

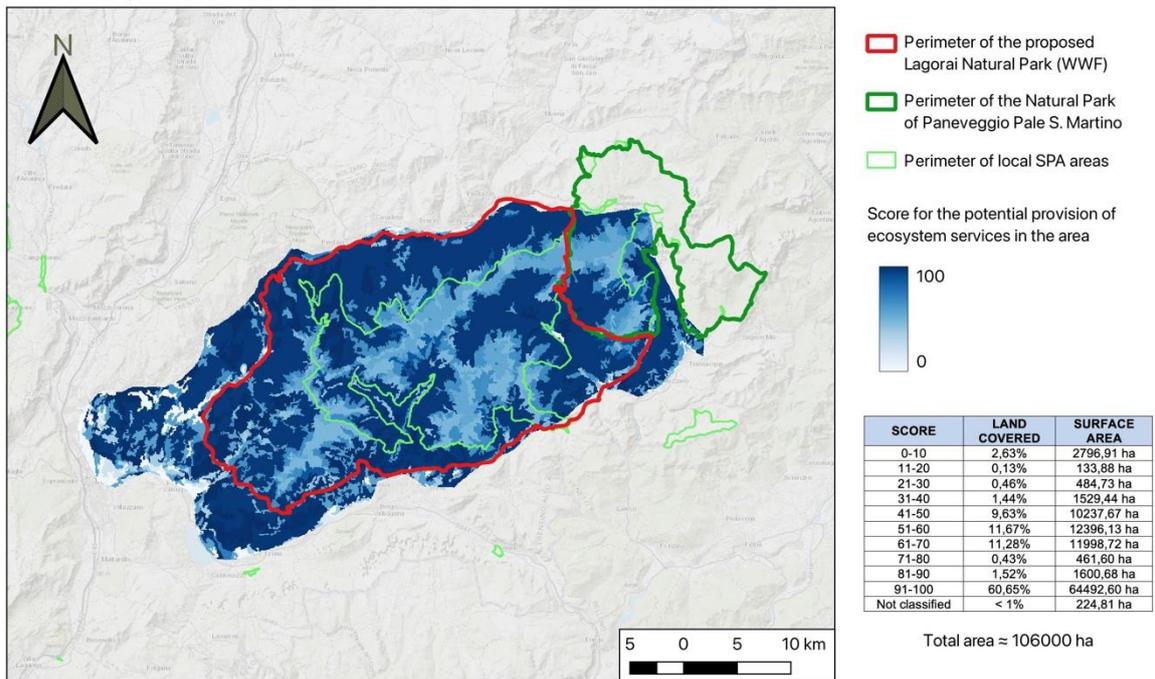
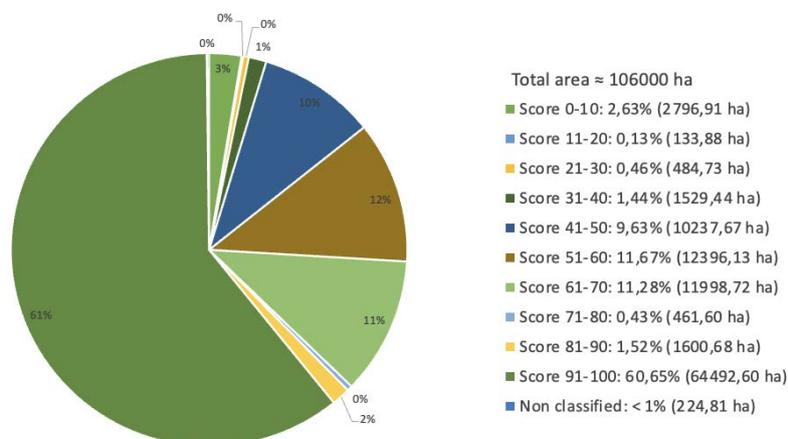


Figure 57: Map on the potential provision of ecosystem services in the area of the Lagorai - Rava - Cima d'Asta mountain range.<sup>201</sup>



<sup>201</sup> Map by Enrico Carraro, 2024.

The final analysis carried out for this research thesis concerns the perimeter of the entire geological area of the Lagorai mountain range, the Cima d'Asta massif, and the Cime di Rava subgroup. This is an even larger area than that of the park proposed by the WWF, with a total surface area of over 106,000 hectares. In terms of geology, westwards the Lagorai stretches as far as the Adige Valley and the built-up eastern suburbs of Trento, given that Monte Calisio is also a part of the Lagorai. To the East, on the other hand, the geological area of the Lagorai extends as far as the Cismon stream, and therefore to part of the Primiero district. The analyses carried out on the territory roughly reconfirm what is true for the park area: almost 61% of the territory is considered capable to provide an excellent supply of ecosystem services that are particularly valuable (with a score between 91 and 100), while those areas that, according to the experts, hardly provide any ecosystem services (with a score between 0 and 40) are marginal and cover less than 5% of the total territory. More specifically, such areas are the ones characterized by continuous and discontinuous urban fabric, industrial plants and warehouses, mines, unirrigated croplands, vineyards, and orchards.

## 7. DISCUSSION

Through extensive research on available scientific literature and interviews with local experts and stakeholders, it was possible to gather a considerable amount of both qualitative and quantitative data on the environment, history and geography of the Lagorai.

This data was instrumental in answering the questions posed in the opening chapter of this thesis.

An attempt will be made below to present the results of the research in a brief but comprehensive manner.

### 7.1 The main environmental, geological, cultural, and historical features of the Lagorai - Rava - Cima d'Asta

As was evident from the data collected during the research, interviews and GIS analyses, the Lagorai is a highly peculiar area which is rich in environmental, geological, historical, archaeological and cultural features.

The prevailing kinds of ecosystems within the Lagorai are broad-leaved, coniferous and mixed forests, extensive grasslands, screes, and areas of bare rock located at high altitudes. Other kinds of habitats that are less widespread in the area, but no less important than those mentioned above, are the numerous high-altitude lakes and wetlands, as well as the pastures and transitional forests located near the *malghe*.

As emphasised by several interviewees, all these areas show high biodiversity and are usually scarcely affected by human interference, since anthropic activities have been much less destructive in the Lagorai than in other parts of the nearby Dolomites and the rest of the Alps. Wildlife is abundant in the mountain range, precisely due to the presence of largely unpopulated areas; nevertheless, as reported by respondents # 231118b and # 231210, the flight initiation distance (FID)<sup>202</sup> of local animal species is

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<sup>202</sup> The flight initiation distance (FID) is usually defined as “the distance at which an animal will start to move away from an approaching threat”, such as a hunter or a predator (USDA - National Agroforestry Center, 2024).

extremely high and this is a direct consequence of overhunting. This can mostly be observed in the southern part of the mountain range, near the Valsugana and Tesino area.

Moreover, as revealed by the sources, analyses, and most notably the interviews, especially those with respondents # 231118a, # 231117b, # 231210 and # 231118b, one of the most peculiar features of the Lagorai is the abundance of water, not only in its various streams, brooks and torrents, but also in the over 110 lakes that are scattered throughout the mountain range and form a major water reserve. It should be noted, however, that although in appearance there is plenty of water, this is almost exclusively located at surface level. This is because the porphyritic rocks of which the Lagorai is composed are impermeable and thus prevent any significant water accumulation in underground aquifers. As a result, the Lagorai territory can suffer severe drought in times of low rainfall, and this comes despite the conspicuous presence of lakes and streams throughout the whole mountain range.

Regarding the permanent marks left by humans on the local territory, it can be stated that the few human traces present in the mountain range incorporate well with its rich natural heritage. As a matter of fact, they further enrich the already significant heritage of the Lagorai and provide additional historical, archaeological and cultural values.

This topic was investigated more thoroughly when conducting the bibliographic research and the interview with archaeologist #231117b. Various studies carried out over the last decades throughout the whole Lagorai have revealed the presence of numerous primitive campsites and other locations associated with stone and metal processing activities. Many of these sites date back to the Mesolithic period and constitute important archaeological evidence of the prehistoric presence of human groups in the Lagorai mountains.

Furthermore, a unique border marker dating back to the Roman era has been discovered near Monte Pergol, the only such evidence in the entire mountain range. The epigraph's Latin origin has been confirmed after a long and lively debate among historians and experts, thereby confirming the role played by the Lagorai territory also during Roman times.

Additional historical traces may also be identified in the high-altitude forests and pastures, where there are centuries-old *malghe* and *baite* that are built out of wood or local stone and are still used by shepherds for seasonal animal husbandry.

However, the most significant human marks date back to the First World War. In this period of history, several valleys, mountainsides and high ridges were excavated, fortified, mined and heavily scarred as a result of the warfare between the Italian and the Austro-Hungarian armies. Today, more than one hundred years after the end of the conflict, these traces appear to be well integrated within the natural and geological landscape of the Lagorai, and contribute to define its unique character. Not surprisingly, a significant percentage of tourists come to visit these mountains precisely to see these wartime remains, which ought to be further valued and preserved, as specifically suggested by interviewees # 231209a, # 231117b, and # 231111.

In conclusion, the Lagorai area can be regarded as a very rich territory, in terms of both natural features and cultural values. The existence of several valley communities, each with its own history and traditions, should also be considered as an additional element that can be leveraged to enhance the local heritage. Therefore, on the basis of all these observations, it seems advisable and worthwhile to plan actions of further environmental and cultural conservation for the entire Lagorai mountain range.

## **7.2 A reflection on past proposals for conservation and current environmental protection measures in force in the Lagorai territory**

As revealed by the available scientific literature, by the interviews, and especially by the significant number of articles retrieved from archived daily newspapers, the environmental and cultural conservation of the Lagorai has long been at the core of heated debates. The main theme has always been the establishment of a natural park covering the entire mountain range, with the promise of benefits for both the environment and the economy of the surrounding villages and valley communities.

Despite having first been put forward by respected experts of the scientific community in Trentino, and then also by a major international environmental organisation such as

the WWF, the Lagorai Natural Park was never established, primarily due to the opposition of several local politicians, who were driven by personal economic interests and who managed to persuade a large enough part of the population of the valleys to boycott the park. The ideological conflict between the critics of the park and its supporters, who instead sought to safeguard the Lagorai against the numerous exploitation attempts made in the 1980s and 1990s, finds evidence in the countless newspaper articles and press releases from that time, which provided a platform for public debate.

As confirmed by various sources and also by some of the interviewees, the park almost came into force when a draft provincial bill for its creation was put forward by two members of the Provincial Council. Moreover, it should be emphasised that despite some criticism, the park project received strong support from a large part of the local population, especially on the southern and eastern sides of the Lagorai. As a matter of fact, many of those living in these areas regarded the park as a viable opportunity of economic recovery. This public support clearly emerges from both the opinion poll *Sondaggio di opinione sull'idea di parco nel Lagorai - Rava - Cima d'Asta* (Sezioni SAT di Borgo Valsugana - Tesino, 1991), which was carried out in Valsugana on a sample of almost 1,200 people, and from the 1995 petition in favour of the establishment of the Park, which was signed by a remarkable 10,750 inhabitants of the eastern valleys of Trentino.

If one criticism can be levelled at the visionary park proposal put forward by the WWF it is that it was probably overambitious considering the most common mindset of the time. Indeed, as stated by interviewee # 231118b, at that time people were not yet ready to embrace the concept of a park mainly centred on environmental conservation. Indeed, as can be seen in the 1993 map of the zoning proposed by the WWF for the park (Figure 31), the project involved the transformation of considerable portions of the territory into *integral reserves*<sup>203</sup>, i.e. areas where “only interventions that are essential for scientific research are allowed and to which access is in any case permitted along existing trails”<sup>204</sup> (WWF - Trentino Delegation, 1993). Had some of these areas,

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<sup>203</sup> [Original definition] “riserve integrali”.

<sup>204</sup> [Original quotation] “sono consentiti gli interventi indispensabili alla sola ricerca scientifica e alle quali è comunque permesso l'accesso attraverso sentieri esistenti” (WWF - Delegazione del Trentino, 1993).

particularly those located on the Fiemme mountainside, been given instead the less restrictive status of *guided reserves*<sup>205</sup>, i.e. areas “where, without neglecting the need for environmental protection, traditional agricultural, silvicultural and livestock farming activities are still permitted, as well as any improvements to existing buildings [such as the *malghe*]” (WWF - Trentino Delegation, 1993), then perhaps the administrators of the Fiemme Valley would have expressed less resentment against the park project.

It should also be noted, however, that a guided reserve might not be the best solution to effectively protect the Lagorai, considering the urban speculations that have been authorised and promoted in recent years, also in the Fiemme Valley, as part of the *TransLagorai Project* of 2018. As a matter of fact, this kind of protection measure inevitably opens the way to ill-defined “interventions for the improvement of existing buildings” (WWF - Trentino Delegation, 1993), which can easily turn into projects that are detrimental to the natural landscape and biodiversity. Apparently, neither the local administrations nor the valley communities, and not even the Autonomous Province of Trento, have yet had the will or power to interdict some of these harmful and environmentally unsustainable interventions.

As we have already seen in one of the previous chapters, the only protection measure currently in force in the Lagorai is the European Natura 2000 network of natural sites. More specifically, this includes the Lagorai SPA (SPA IT3120160), which extends over an area of approximately 46,000 hectares and encompasses sections of the Fiemme Valley, the Valsugana, and the Paneveggio Pale di San Martino Natural Park, for a total of 13 distinct Sites of Community Importance (SCIs). Several respondents have pointed out the inadequacy of this conservation measure, which despite covering a relatively large area, is passive by its very nature. Indeed, SCIs, SPAs and SACs mainly offer static forms of protection, based on the ban on certain activities rather than on active management and valorisation strategies. Moreover, as opposed to natural parks and certain protected areas, Natura 2000 sites have no dedicated administrative boards, do not receive any fixed financing, and do not even generate any direct revenue.

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<sup>205</sup> [Original definition] “riserve guidate”.

A further critical issue concerning the Lagorai SPA (IT3120160), which was also pointed out by interviewees # 231118b and # 231209a, both of whom are managers of protected areas, lies in the ignorance about the existence of such a protected area on the part of tourists and local inhabitants. If even those who live in the Lagorai are unaware of how the territory is safeguarded, this means that the conservation measures that are in force are likely to be ineffective, and it also reveals a widespread lack of environmental awareness. It should be the duty of institutions to foster public education on environmental and sustainability issues.

With regard to the Reti di Riserve, which were first established by the Autonomous Province of Trento in 2007 and have since proven to be a highly effective and participated land management tool, they are unfortunately not yet implemented in the Lagorai, if not only peripherally on the mountainsides of the Valsugana to the south and the Cembra Valley to the north-west.

In addition, there are also vast areas which are included in the various ecomuseums that are currently active on the Lagorai territory and in its valleys. As revealed by the interviews with respondents # 231117a - who is in charge of one such ecomuseum - , # 231111, and #231210, the ecomuseums fulfil the fundamental task of promoting the cultural and ethnographic value of the local territory. Moreover, they also play a role in increasing ecological awareness and consideration for the local heritage among both adults and younger generations. However, as lamented by interviewee # 231118b, the ecomuseums all too often operate only at a local level, thus failing to cooperate with each other. This happens despite the fact that a network of the *Ecomusei del Trentino*<sup>206</sup> has already been established and is active since 2011.

Lastly, it should be remembered that there is also another example of environmental conservation in the Lagorai, that of the *Oasi WWF di Valtrigona*. This is a private nature sanctuary, administered by the WWF and also run with the help of volunteers. It is a place where various environmental conservation activities are performed throughout the year, as well as regular public education on the environmental and the intangible assets of the area. As can be inferred from the maps used for the GIS project, the GIS analyses carried out on the area of the *Oasi WWF di Valtrigona*, and some of the

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<sup>206</sup> [Translated title] "Ecomuseums of Trentino".

interviews, the WWF reserve is simply too small to provide adequate protection at the level of the entire mountain range. It can, however, serve as a good model for the establishment of other similar conservation areas in the Lagorai. Ideally, such areas could be based on the same ethic of conservation and public engagement adopted by the WWF, but have larger territorial coverage and receive proper public funding.

In conclusion, it is evident that the current protection measures in force in the Lagorai are insufficient to ensure the complete conservation of the mountain range. Therefore, in a future perspective it would be desirable to work together with the local population and the valley communities in order to introduce new guidelines on how to carry out traditional activities in a sustainable way, and to institute improved conservation areas.

As suggested by interviewee # 231117a, who runs an ecomuseum and is therefore experienced in working with the public, these new areas could be governed by means of discussion tables held on a regular basis and attended by scientists, experts, citizens, and other public representatives. Undoubtedly, the valley communities can no longer be the exclusive managers of the territory, given the mistakes that they have committed in the past and the short-sightedness they've shown when supporting certain unsustainable projects.

### **7.3 The most relevant ecosystem services for the conservation of the environmental and cultural heritage of the Lagorai**

As previously stated, the Lagorai territory is characterised by an impressive variety of natural and semi-natural habitats, which provide a wide range of ecosystem services. Some of these services are particularly important for the maintenance of the balance between man and the natural environment, for the continuation of traditional agro-forestry activities, and for the preservation of biodiversity.

For the purpose of this thesis, it was decided to investigate the current capacity of different areas within the Lagorai area to potentially provide ecosystem services through a participative approach, by drawing on the qualitative data collected during the interviews and on the GIS analyses carried out on the geological region of the

Lagorai, the Lagorai Natural Park proposed by the WWF, and the various other sites identified as worthy of special protection by the interviewees.

As it is very clear from the interviews and the available scientific literature, the supporting ecosystem services are to be considered the most important ones in the Lagorai territory. Healthy soils, together with an abundant primary production and a proper circulation of nutrients, result in ecosystems that are extremely favourable to the survival and development of various animal and plant species, some of which are endemic to the Lagorai alone and are thus of great ecological interest. Moreover, the biodiversity found within the mountain range, particularly in the inland areas where there is the least anthropic pressure, results in an optimal functioning of local ecosystems.

From this wide estimated capacity to provide supporting ecosystem services, which are the basis for the other three groups of services, stem also a number of other provisioning benefits provided by the natural environment to humans. More specifically, as was indicated by most respondents, the availability of timber represents a vital ecosystem service for the livelihood of local communities of the valleys, which rely on logging as a significant source of income. According to the available literature, this is especially true for the Fiemme Valley, the Vanoi Valley and some areas of the Primiero Valley. It is obvious, though, that in order to be sustainable, timber harvesting must be conducted in accordance with sustainable principles and giving forests the time they need to grow back.

As stated by interviewee # 231111, a former forester in the Fiemme Valley, it is imperative to preserve old-growth forests and to gradually replace monospecific coeval forests with more diverse ones, as the latter have the natural ability to thwart the spread of diseases and pest, and can thus ensure the provision of another important ecosystem service, i.e. natural pest control. In the near future it will therefore become necessary to redesign the current methods and rules governing timber harvesting, so as to make them more sustainable in the light of climate change and of the massive devastation caused by the 2018 Vaia storm.

All interviewees, and especially respondents # 231210 and # 231118b, also emphasised the importance of water availability, which is another fundamental

provisioning ecosystem service. Despite water being largely available in the Lagorai, at least at the surface, it must be borne in mind that in the past there have been attempts to use water for energy production, to create large reservoirs designed to supply water to neighbouring regions, and to embank rivers and streams. If implemented, such projects would have jeopardised the integrity of local riverine ecosystems, thereby also reducing the quality and quantity of fresh water available to local communities. Thankfully, so far most of the proposals aimed at the overexploitation of the water resources of the Lagorai have been halted in time. Nonetheless, in the future special care must be paid to water management, also considering the droughts caused by climate change.

The importance of another provisioning ecosystem service was also noted: food supply. As emphasised by all interviewees, fruits, vegetables, milk and cheese produced in the Lagorai are of the highest quality, and this is the result of healthy pastures, fertile soils, and plentiful surface water. In a future perspective, it would be desirable to establish agricultural cooperatives among local farmers, and especially among cheese producers. This could probably result in the official recognition of the unique qualities of the dairy products of the Lagorai, ideally by means of a PDO (Protected Designation of Origin) or a PGI (Protected Geographical Indication) food label.

With regard to regulating ecosystem services, four of them emerged as being the most relevant ones. First of all, flood management and erosion control, both of which are extremely crucial for the Lagorai given the ancient orogenesis and the impermeability of its porphyritic rocks, two factors that facilitate landslides and surface runoff. In addition, linking up with the previous section on water availability, the issue of water purification appears to be crucial. Water purification can only be achieved by maintaining healthy forests and grasslands, by preserving the integrity of high-altitude lakes and wetlands, and also by protecting soils from any form of contamination. Lastly, carbon storage and climate regulation are also relevant. In the Lagorai these two regulating services are provided by the lush forests as well as the peat bogs and marshlands. As stated by respondent # 231206, an elected representative in the Fiemme Valley, action should be taken at the political and administrative level to enhance their provision.

In light of the data collected and the results of the interviews, cultural ecosystem services also proved to be very important. All the respondents noted the presence of vast areas that are suitable for ecotourism, slow tourism and sustainable recreational activities such as trekking, long-distance hiking, clean climbing and ski mountaineering. In addition, certain areas appear to be so pristine as to offer benefits for physical and mental health. The interviewees then emphasised the value of traditional systems of knowledge, i.e. the whole set of local customs and traditions that is still present in the Lagorai and that gives this area a distinctive anthropological identity. Certain agricultural and pastoral practices should be encouraged in order to keep the historical and architectural legacy of the *malghe* intact and not to deprive local communities of an essential source of income. However, it remains advisable to provide precise regulations on how and where to perpetuate these long-established agrosilvopastoral activities, analogous to what should be done for timber harvesting.

Lastly, one should not overlook the benefits provided by the rich environmental, cultural, geological, historical and archaeological assets of the Lagorai to cognitive development. As a matter of fact, the peculiar features of the area shall be leveraged to conduct environmental and cultural education among local inhabitants and tourists.

## **7.4 Significant areas and strategies for their conservation**

In an ideal perspective it would be desirable to safeguard the entire territory of the Lagorai, as suggested by interviewee # 231209b. However, it should also be noted that there are some areas within the mountain range that stand out from the others because of their distinctive environmental, geological, scenic, historical and cultural features. It is precisely in these sites that the first conservation areas of the Lagorai could possibly be established. Only at a later stage, if appropriate, could the further extension of such protection measures to other zones be considered.

As was shown in the Chapter RESULTS, 7 areas were identified for this research project, on the basis of the qualitative data provided by the interviewees and the information collected from several other sources. Such areas are the following ones: area of the Buse di Malacarne and Upper Val Zanchetta; area of the Cima d'Asta

massif; area of Lake Lagorai and Lake Bombasel; area of the Oasi WWF di Valtrigona; area of Monte Panarotta, Monte Fravort, and Sette Selle; area of the Campelle and Montalon Valleys, the “Corona del Lagorai”, the Forame Valley, and the Upper Moena Valley; area of the Vanoi Valley.

Each of these areas has land cover classes that ensure the provision of all the ecosystem services indicated as relevant by the interviewees.

As can be seen from the spatialised data presented for each area, almost none of them contain zones where the potential supply of ecosystem services has a score of less than 40 out of 100 on the scale that we have established for the purpose of the GIS analyses. This implies that each of the areas indicated by the respondents does indeed present highly remarkable natural and historical features, which might result in a good or even excellent provision of ecosystem services. The only two exceptions are represented by 1.78 hectares of land (0.03% of the total surface) in the area of the Cima d'Asta massif and 102.9 hectares of land (0.5% of the total surface) in the Valle del Vanoi area. In these small areas, the scoring of ecosystem services receives a very low value, ranging from 0 to 10 on a 0 to 100 scale. It is clear, however, that these minor fractions of the territory are totally negligible; moreover, they obtain such a low rating only because they are comprised of small villages and other urban settlements that inherently cannot provide many ecosystem services.

The results of the analyses also show that the prevailing land cover classes in all the examined areas are the ones with the most natural attributes, namely those same classes that were assigned a high value for service provision in the matrix utilised for the GIS analyses. It is thus no coincidence that the prevailing habitats in the surveyed areas are forests (broad forests, coniferous forests, and mixed forests), large natural grasslands at high and medium altitudes, and pastures.

High-altitude lakes are also present in some of the communal areas analysed in this research. This is clear because some sections of the territory fall in the range 71-80, i.e. the score values attributed exclusively to the class of the matrix that comprises the land cover class relative to water bodies. Lakes were detected in the following zones: the area of the Cima d'Asta massif ( $\approx$  15 ha of its surface are covered by lakes); the area of the Lagorai and Bombasel Lakes ( $\approx$  21 ha of its surface are covered by lakes);

the area of Monte Panarotta, Monte Fravort, and Sette Selle ( $\approx 5$  ha of its surface are covered by lakes); the area of the Campelle and Montalon Valleys, the "Corona del Lagorai", the Forame Valley, and the Upper Moena Valley ( $\approx 18$  ha of its surface are covered by lakes); and the area of the Vanoi Valley ( $\approx 24$  ha of its surface are covered by lakes). By contrast, mountain lakes appear to be absent in the *Oasi WWF di Valtrigona* and in the area of the Buse di Malacarne and Upper Val Zanchetta. In both instances, however, some lakelets are actually present, but they are too small to be detected in the zonal histogram generated for this thesis. These minor water bodies are respectively the Laghetto dell'Agnelezza, also known as Laghetto dei Tritoni, in the *Oasi WWF di Valtrigona*, and the Laghetti di Valzanchetta in the area of the Buse di Malacarne and Upper Val Zanchetta.

The presence of such numerous lakes and lakelets in all the investigated areas proves once again what was pointed out by all interviewees, namely that the Lagorai mountain range is dotted with water bodies that play a fundamental role in supplying water to the valleys and supporting life in the surrounding habitats.

At this point it is also worth explaining why bare rock and sparsely vegetated areas, two land cover classes that are usually found at high altitudes, also received fairly good scores for ecosystem service provision, with values ranging between 41 and 60. Such areas may not provide much in terms of habitat support or regulation, but they do carry considerable cultural significance due to the presence of entrenchments, casemates and other historical remains dating back to the First World War. This is why they are still regarded as relevant areas for the provision of ecosystem services.

Considering the results presented and discussed so far, all the areas examined for this research thesis appear to be worthy of protection, since they provide large amounts of ecosystem services associated with both natural habitats and cultural heritage.

However, if one were to indicate the areas that should be given absolute priority in terms of protection and conservation, it would seem appropriate to select the following four locations:

- **the area of the Cima d'Asta massif**, and especially its northward and north-eastward slopes, as this is an almost unspoilt territory, which may perhaps be identified as the closest thing to a 'wilderness' there can be in the Lagorai

mountains. This area also includes the entire western side of the Vanoi Valley. The establishment of a reserve in this area would certainly also be beneficial for the Vanoi community, because it would provide a mark of environmental distinction to a valley that has frequently struggled in the past due to a localised economic crisis and an alarming trend of depopulation;



Figure 58: The almost untouched forests of the Val Viosa, on the north-eastern slope of the Cima d'Asta massif. This area has been referred to as a wilderness by some of the interviewees precisely because of the minimal human influence on its landscape.<sup>207</sup>

- **the area near Lake Lagorai and Lake Bombasel.** Not only does this area include the major water body of the entire mountain range, but it is also partially excluded from the perimeter of the Lagorai SPA. This implies that a significant section of the area is devoid of any form of environmental protection, including passive ones. This place requires immediate safeguard, given its proximity to the overexploited Cermis ski area, and the recent proposals regarding the conversion into a restaurant of Malga Lagorai, which is located on the shore of Lake Lagorai;

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<sup>207</sup> Photograph by Enrico Carraro, 2023.

- **the area surrounding Monte Panarotta, Monte Fravort, and Sette Selle**, due to its scenic value and the presence of widespread high-altitude meadows. This area is also significant from an archaeological point of view, as it contains campsites and other human traces that date back to prehistoric times. It also includes the Panarotta ski area, which has not been functioning for a couple of years now due to the lack of snowfalls caused by climate change. For this area, an enhancement in both naturalistic and experiential terms could be envisaged, drawing on both sustainable leisure activities and cultural tourism linked to the presence of historical traces from World War I. An intervention in this area is deemed urgent because it lies almost completely outside the perimeter of the Lagorai SPA, and also because of the initiative proposed in 2023 by some Trentino entrepreneurs to revive the ski area in Panarotta, with a project that appears to be far from sustainable and which fails to consider the changing climate (“Turismo in estate e inverno”, 2023);
- lastly, **the area of the Campelle and Montalon Valleys, the “Corona del Lagorai”, the Forame Valley, and the Upper Moena Valley**, since this is the heart of the Lagorai and it boasts a huge variety of natural and historical features. As is evident from the digital cartographic representations provided in the Chapter RESULTS, in the northernmost and southernmost parts of the area there are predominantly woodlands and mountain slopes covered with trees and shrubs. The middle section, on the other hand, is the so-called “Corona del Lagorai”, which is characterised by vast expanses of grassland, pastureland, bare rock areas, as well as some freshwater lakes of rare beauty: Lago delle Stellune, Lago delle Buse, Lago di Montalon, and the Laghi delle Buse Basse. Furthermore, as we have already seen, there are also significant historical traces dating back to different epochs: prehistory, the Roman times, and the early 20<sup>th</sup> Century. Finally, it must also be considered that a section of this area is not included in the existing Lagorai SPA.

Needless to say, also the three other areas analysed in this thesis would certainly all be worth safeguarding and enhancing.

However, the Vanoi Valley is perhaps too widespread for the successful establishment of a single conservation area covering its entire territory. Instead, it would be advisable

to consider the creation of multiple protection areas in the valley. Nevertheless, it should be recalled that almost half of the Vanoi Valley has already been included in the proposed conservation area covering the Cima d'Asta massif.

On the other hand, with regard to the Valtrigona, it should be noted that it is an area that has already been perfectly safeguarded from a naturalistic point of view, given the superb work performed by its governing organisation, the WWF. Therefore, instead of new conservation measures, this area would deserve more recognition for the successful work done so far, and ideally also public funding.

Finally, with respect to the area of the Buse di Malacarne and Upper Val Zanchetta, it must be said that it is in fact already included in the Paneveggio Pale di San Martino Natural Park. It can thus be assumed that this area is already adequately protected.

In conclusion, as already mentioned, for all the areas analysed in this thesis it would be desirable to implement a more advanced form of protection than the one currently provided by the Natura 2000 network. As suggested by some of the interviewees, particularly # 231118b and # 231209a, two managers of protected areas, the most effective measure would probably be the *Rete di Riserve*. This network of protected areas should ideally cover all the areas analysed in this research thesis, and possibly also a few other parts of the Lagorai. A *Rete di Riserve* would bring numerous advantages: besides the continuation of traditional agro-forestry activities, it would also offer the chance to directly involve citizens, local administrations and valley communities in the active management of the protected areas. As a matter of fact, individual municipalities can access the *Rete di Riserve* on a voluntary basis, with the assurance of becoming part of a venture based on the values of grassroots public participation in environmental governance, cooperation and responsible subsidiarity, as well as on the integration of nature conservation and sustainable economic development.

## **7.5 Difficulties and problems encountered during this research**

In order to successfully complete this thesis work, a number of challenges had to be overcome.

First of all, when examining the available sources pertaining to the Lagorai, a relative scarcity of recent publications and scientific articles in the field of natural sciences was detected. This is somewhat surprising, given the large extension of the territory being analysed and the great variety of research opportunities that it certainly offers.

Secondly, with regard to the GIS work, additional research would be needed, carried out with a larger group of interviewees in a comprehensive participatory process. This would help to identify more precisely those areas that are perceived as worthy of special conservation measures. Such research could then also integrate an accurate collection of field data.

## 8. CONCLUSIONS

Overall, the main objectives of this research thesis have been achieved.

It was possible to accurately reconstruct the geographical, historical, cultural and social context of this thesis, and to elaborate digital cartographic representations for a significant number of areas within the Lagorai mountain range, as well as for the entire geological region of the Lagorai - Rava - Cima d'Asta. It also became possible to carry out detailed analyses of land cover and the potential provision of ecosystem services in the various areas identified for this research work.

As a result, the initial questions regarding the main features of the Lagorai territory, the past conservation proposals, the protection measures currently in force, the potential provision of ecosystem services, and the areas requiring further protection were all answered.

The hope is that this research work will contribute to a better understanding of the Lagorai mountain range, and also stimulate new initiatives for its enhancement and conservation, both in environmental and cultural terms.

A further meeting with some of the interviewees and other local stakeholders is conceivable in the future, in order to publicly report the results of the research work and collectively discuss the practicability of the conservation measures suggested in the thesis.

This work is also intended as a basis for further research aimed at identifying additional areas in the Lagorai which require special protection. Furthermore, a more detailed assessment of land cover is desirable, specifically for those areas that were indicated as important by the interviewees but were then excluded from the communal areas analysed in this research thesis.

A final hope is also that the data gathered and processed over the course of this research work may possibly serve as a useful contribution to those local organisations and actors that are also trying to identify new and sustainable solutions for the conservation and enhancement of the Lagorai – Rava – Cima d'Asta territory.

## **9. APPENDIX**

The transcripts of the interviews carried out for this research thesis have a permanent embargo and are archived in a private online database ([https://drive.google.com/drive/folders/106Gz82JU\\_PExd-8Yd\\_FxvTbDOSSYf1I?usp=drive\\_link](https://drive.google.com/drive/folders/106Gz82JU_PExd-8Yd_FxvTbDOSSYf1I?usp=drive_link)), which can only be accessed with a password.

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