

***Hochschule für Forstwirtschaft Rottenburg***


***Virgin & Old Growth Forest in  
Romania - Safeguarding European  
Biodiversity Heritage  
(Project OldGroFoRo)***

***Funded by Deutsche Bundesstiftung Umwelt (DBU)***

***Prof. Dr. Rainer Luick & Matthias Schickhofer***

***Final Report (Abschlussbericht),  
December 2019***



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<p><b>Zielsetzung und Anlass des Vorhabens</b></p> <p>Die Deutsche Bundesstiftung Umwelt (DBU) fördert in der Arbeitsgruppe von Prof. Dr. Rainer Luick ein Forschungsvorhaben, das sich beginnend im Jahr 2017 und bis 2019 laufend mit der Inventarisierung von Urwaldreservaten in Rumänien beschäftigt.</p> <p>Weniger als 1% aller europäischen Wälder vermitteln noch ihr ursprüngliches Aussehen und ihre faszinierende biologische Vielfalt. Der Großteil aller noch erhaltenen großflächigen europäischen Urwälder (außerhalb von Russland) liegt im Karpatenbogen und hier in erster Linie in den rumänischen Karpaten. Dort gab es noch um das Jahr 2000 geschätzt 200.000 ha Wälder mit sehr unterschiedlichen Waldtypen, die über Jahrtausende ohne Nutzungseinfluss waren, bzw. nur marginale Spuren historischer Nutzungen aufweisen (so genannte "Quasiurwälder"). Mit dem EU Beitritt und dem Engagement von ausländischen Holzkonzernen, die überwiegend aus Österreich und Deutschland stammen, sind diese Urwaldflächen auf vermutlich schon weniger als 150.000 ha geschrumpft. Massive illegale und auf zweifelhafte Weise "legalisierte" Einschläge, aber auch ein vielfach nur in der Theorie bestehender Schutzstatus, sind die Ursachen.</p> <p>Die bis Dezember 2016 amtierende Übergangsregierung hatte zwar noch die gesetzlichen Verbesserungen für einen umfassenden Schutz der Urwälder auf den Weg gebracht. Alle Urwälder sind jetzt zwar prinzipiell geschützt, aber erst, wenn diese in einen nationalen Katalog aufgenommen sind. Für eine Listung im "Urwaldkatalog" müssen die Urwaldstandorte nach einem standardisierten Verfahren erfasst und in Verbindung mit einem wissenschaftliche fundierten Gutachten an die zuständigen Behörden und Ministerien gemeldet werden. Zwar gibt es in Rumänien kompetente Forstwissenschaftler, allein es fehlen die Mittel, um diese Inventur zügig durchzuführen. Mit den Mitteln der DBU können nun in den kommenden beiden Jahren Urwaldreservate im Umfang bis zu 10.000 ha untersucht und inventarisiert werden.</p>					



### ***Darstellung der Arbeitsschritte und der angewandten Methoden***

Die Koordinierung liegt bei Prof. Dr. Rainer Luick; die eigentlichen wissenschaftlichen Arbeiten werden von Experten in Rumänien durchgeführt. Als Koordinator ist Matthias Schickhofer, ein europaweit anerkannter Experte zu Urwaldfragen mit Sitz in Wien zuständig.

Mehrere Teams rumänischer Wissenschaftler haben in den vergangenen zwei Jahren Waldgebiete identifiziert, kartiert und gutachterlich dokumentiert, die nach den nationalen Kriterien potentielle Urwaldschutzgebiete sind. Auf Grundlage der Studien, die in enger Kooperation mit dem rumänischen Ministerium für Umwelt erstellt werden, werden wichtige Beiträge zum langfristigen Schutz dieser letzten europäischen Wälder geleistet.

Eine große Hilfe bei den Arbeiten ist die räumliche Orientierung mittels Drohnen, die für das Forschungsprojekt beschafft wurden. Es ist faszinierend, wie die Drohnen selbst in einem dichten Waldbestand in einem engen Lichtschacht aufsteigen können und aus bis zu 500 m Höhe spektakuläre Aufnahmen über diese letzten europäischen Urwälder ermöglichen. So können sogar problemlos die Baumhöhen bestimmt werden und erlauben Einblicke in den Mikrokosmos der Kronenregionen der bis zu 60 m hohen Bäume; Lebensräume, die vom Boden nicht beurteilt werden können.

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### ***Ergebnisse, Fazit und Diskussion***

Fokus der Kartierungen waren Waldgebiete in den südlichen Fogarascher Alpen. Während in den Hochlagen der Gebirge schon seit sehr langer Zeit oft eine traditionelle Weidewirtschaft betrieben wird, wurden die steilen Täler kaum oder gar nicht erschlossen. Dort sind an beiden Hangflanken und auch entlang der Flüsse großflächige Wald- Wildnisgebiete erhalten geblieben. Besonders spektakulär sind die Wildnistäler Boia Mica und Lătești. Leider sind diese Urwaldgebiete - wie viele andere auch - derzeit nicht wirksam geschützt und Holzeinschlag, der in Rumänien in aller Regel in großflächigem Kahlschlag erfolgt - kann jederzeit stattfinden. Es wurden im Rahmen des Projektes zahlreiche Kartierungen und Gutachten erstellt als Voraussetzung für eine legale Unterschutzstellung.

Auf Grundlage (1) der sogenannten „PIN-MATRA“ Studie von 2005, des (2) „REMOTE Projektes“ der Universität Prag und des „PRIMO-FARO“-Projektes der Stiftung Euronatur wurden Suchräume für das vermutete Vorkommen von Primärwäldern in einer Dimension von 15.000 ha selektiert. Im Detail wurden in diesen Suchräumen ca. 5.200 ha untersucht und für 32 Gebiete Gutachten entsprechend den Kriterien des Nationalen Katalogprojektes erstellt. Mit Status Dezember 2019 sind davon rund 3.200 ha verteilt auf 32 Gebiete als Urwälder gemäß den Kriterien der rumänischen Regierung anerkannt; weitere Gebiete sind noch im Anerkennungsverfahren.

Im Dezember 2019 kam es in Rumänien zu einem Regierungswechsel. Die Signale zur Positionierung zum Thema Urwaldschutz, die uns erreichen sind deutlich positiver als in der Vergangenheit. Wir gehen davon aus, dass in den kommenden Monaten mit einer unterstützenden und wohlwollenden Bearbeitung der noch anhängenden Gutachten zu rechnen ist. Leider wird sich die grundsätzliche Problematik nicht ändern, dass notwendige Arbeiten und das Engagement für den Schutz der letzten großflächigen Urwälder in der EU von Förderprojekten aus dem Ausland abhängig ist.

Während der ganzen Projektlaufzeit wurde intensiv über das Projekt, die Intention und über Ergebnisse berichtet; das Medienecho war und ist beachtlich (s. Dokumentation). In mehreren Publikationen und auf Kongressen wurde über das Vorhaben referiert. Siehe dazu auch die online Veröffentlichungen auf den Seiten der Hochschule für Forstwirtschaft und DBU (<https://www.hs-rottenburg.net/aktuelles/aktuelle-meldungen/detail/artikel/forschungsprojekte-zu-oekologischen-hotspots-in-rumaenien/>; <https://www.hs-rottenburg.net/aktuelles/aktuelle-meldungen/detail/artikel/bedrohte-wildnis-unterwegs-in-rumaeniens-urwaeldern/>; <https://www.hs-rottenburg.net/aktuelles/aktuelle-meldungen/detail/artikel/wettlauf-um-rumaeniens-urwald/>; <https://www.derstandard.de/story/2000069740402/kampf-um-rumaeniens-urwaelder/>; <http://www.saveparadiseforests.eu/de/tag/rumaenien/>;

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# 1. Summary

Romania holds the biggest share of old growth and primary forests within temperate EU-regions (outside Scandinavia). Back in 2005 the so-called „Pin Matra“ forest inventory (Pin Matra project; Biris and Veen 2005) identified almost 220,000 hectares of “virgin”<sup>1</sup> forest. Unfortunately, since this time, numerous reports by non-governmental organisations (NGOs) and media have indicated massive and progressing logging of these precious forests, both legally and illegally.

Romania also contributes the largest part to the serial transnational nomination of European beech forests to the World Heritage List, submitted by Austria in January 2016 to UNESCO as extension of the Primeval Beech Forests of the Carpathians and Ancient Beech Forests of Germany. But these large surfaces of remaining virgin forests are also under threat and even in such core areas of biodiversity illegal logging is common practise. Trees of several hundred years of age are logged and sold to consumers throughout Europe as bio-fuel and lumber by the continent’s largest retailers.

So, despite legal improvements, many of the areas that were mapped in 2005 have been degraded or destroyed completely. The loss of highly valuable natural forests continues, even in protected areas such as Natura 2000 sites and buffer zones of UNESCO World Heritage and of national parks.

In 2012, the Romanian government initiated the development of a forest protection program, the „National Catalogue of Virgin and Quasi-virgin Forests“. This „Catalogue“ aims at protecting all intact virgin forests of the country, a unique instrument in EU.

In July 2016, the Romanian Government started a process to allow experts and NGOs to identify and register virgin and quasi-virgin forest remains all over the country and to submit them for inclusion in the „National Catalogue of Virgin Forests“.

However, progress of population of the „Catalogue“ suffered heavily from bureaucratic burdens and unwillingness of representatives as e.g. competent authorities and forest managers, in particular in some regions of Romania.

Finally, in May 2019 only 29.063 hectares of forest - this is less than 0,5 percent of Romania’s forest cover - have been listed for protection in the „National Catalogue of Virgin and Quasi-virgin Forests“<sup>2</sup>. Most of the mapping efforts and development of expert studies were done by NGOs and independent experts, financed from independent sources (such as NGOs and foundations).

Given the size of the country, the number of unprotected and threatened primary forests and the pace of progressing logging an urgent need were identified ...

- to speed up and widen identification and submission of forest stands for protection,
- to highlight the importance of the last remaining virgin (old-growth) European forest ecosystems for science and knowledge gain
- and to develop strategies to inform, communicate and to raise awareness.

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<sup>1</sup> There are numerous definitions of „virgin“ and „old growth forests“ in use, differing from country to country. In Romania „virgin and quasivirgin“ is mainly used in conjunction with forest protection legislation (such as the „National Catalogue of Virgin and Quasivirgin Forests“. Internationally, the terms „primary“ and „old growth“ is used most commonly. We use „virgin and quasivirgin“ when talking about Romanian legislation and formal procedures. And we refer to „primary and old growth forests“ (as defined by CBD / Convention on Biological Diversity) when touching on a more general and international context.

<sup>2</sup> <http://apepaduri.gov.ro/paduri-virgine/>



The problem requires transnational cooperation because of the international importance of the forests as well as because of the international connected structures of forest destruction. It is a mutual challenge for the civil society, NGO, administrations and policy to combat destructive practices and to save this natural treasure.

In order to provide science based support to Romanian efforts for protection of key areas with old growth and primary forests University of Rottenburg namely Prof. Dr. Rainer Luick (Hochschule für Forstwirtschaft Rottenburg) proposed to Deutsche Bundesstiftung Umwelt to set up a joint project entitled „Virgin & Old Growth Forest in Romania – Safeguarding European Biodiversity Heritage“.

The project was prepared and implemented in close co-operation with Romanian forest and ecology experts, with the REMOTE primary forest research project by University for Life Sciences (Prague)<sup>3</sup> and EuroNatur Foundation<sup>4</sup>.

***The main focus of this project was to help with protection of key virgin forest areas of outstanding importance and to contribute to the improved population of the National Catalogue of Virgin Forests.***

Romanian expert teams have been in charge of conducting numerous field visits, prepared expert studies (based upon legal requirements in Romania and scientific data) and communicated with both forest managers, local authorities and the „Technical Commission“ (CTAS) with the Ministry for Water and Forest.

The project supported two expert teams in Romania:

- Team Ecaterina Fodor, Ovidiu Hâruga, Sorin Dorog (Universitt Oradea)
- Team Constantin Cornei, Viorel Butnaru und Ion Holban

Unfortunately the experts' teams reported about severe bureaucratic burdens and a tiring back and forth between the ministerial commission, local forest guards and forest managers. This included numerous repetitive field visits in several cases. The back and forth went over periods of a year and longer in some cases. These obstacles consumed considerable shares of the project budget.

**To address and target still existing „virgin and quasi-virgin“ forest there was exchange with other actors such as WWF to exclude redundant work. Based on intensive pre-selection searching areas at a scope of 15.000 ha were identified. Within such perimeters finally, by November 2019, 5.208 ha of „virgin and quasi-virgin“ forest ( 32 different single areas) have been mapped and expert studies have been submitted to the Romanian governmental authorities for inclusion of these forests into the „National Catalogue of Virgin and Quasi-virgin Forests“.**

**In total, as of December 2019, 3.200 ha of these forests have been approved by authorities (although not all of these forest areas have been publicly listed in the „Catalogue“ when this paper was finished).**

There are recent indications that the new Romanian government shows more ambition to drive forward protection of Romania's highly valuable forest ecosystems. So, there is a positive perspective that also the remaining already mapped virgin forest areas will also be included in the „National Catalogue of Virgin and Quasi-virgin Forests“ and protected for future generations.

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<sup>3</sup> <https://www.remoteforests.org/index.php>

<sup>4</sup> <https://www.euronatur.org/en/>

# **Introduction**

## **2.1. Primary forests of Romania**

The catastrophic heating of the Earth's climate system and the rapidly progressing decline of the Earth's natural ecosystems are equally posing a severe threat to the human world. The "Global Assessment Report on Biodiversity and Ecosystem Services" (IPBES 2019) clearly points out, these two crises are closely interlinked and reinforce each other. Preserving natural ecosystems is a key factor to prevent or at least limit disastrous developments.

However, in Europe there are no so many natural ecosystems left. Almost all wetlands and natural forests have been turned into farmed land or have been replaced by human settlements and infrastructure.

Plantations and unnatural production forests are already massively impacted by increasing frequency and severity of droughts, forest fires, storms and bark beetle attacks. Experts are deeply concerned that Europe may lose a significant share of its forest cover in the coming decades.

Natural forests show better resilience to disturbances caused by a changing heating. Therefore it is of high importance to preserve as many of them as possible as refuges for stable and better-adopted forests and to support future reforestation efforts.

Old-growth and primary forests also store large amounts of carbon. The latest special report "Climate Change and Land" (IPCC 2019) underpinned their importance for mitigation of climate change.

Watson & Evans (2018)<sup>5</sup> point out that, "maintaining and, where possible, restoring the integrity of dwindling intact forests is an urgent priority for current global efforts to halt the ongoing biodiversity crisis, slow rapid climate change and achieve sustainability goals. Retaining the integrity of intact forest ecosystems should be a central component of proactive global and national environmental strategies, alongside current efforts aimed at halting deforestation and promoting reforestation."

Intact natural forest ecosystems differ significantly from degraded and unnatural forest systems: they store more carbon above and below ground. "Intact forests continue to function as major net carbon sinks, actively sequestering carbon into soils and living biomass."

They store "30–70% more carbon than logged and degraded forests". "Keeping the current forest carbon stock intact and undisturbed from industrial land use, and promoting ecological restoration of degraded forest carbon stocks, is a critically important mitigation action if we are to avoid dangerous climate change" (Intact 2015)<sup>6</sup>.

In addition, natural forest ecosystems provide habitats for many species - such as saproxylic beetles, fastidious birds or mammals, rare plant species, fungi, lichens, etc. - that are more or less extinct in intensively managed areas. Often, this extraordinary biodiversity of virgin forests is not easily visible because it clings to decaying wood or soil.

Thus, the preservation of the last remains of primary and old-growth forest in Europe deserves special efforts. This particularly accounts for the vast natural forest remains in Romania.

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<sup>5</sup> Watson J. E. M. & Evans E. (2018): The exceptional value of intact forest ecosystems. *Nature Ecology and Evolution*.

<sup>6</sup> Intact – International Action for Primary Forests (n.d.): Fact Sheet No. 1 Primary Forests and Carbon. [https://primaryforest.org/wp-content/uploads/2015/12/ForestCarbonFactsheet\\_26112015.pdf](https://primaryforest.org/wp-content/uploads/2015/12/ForestCarbonFactsheet_26112015.pdf).

Romania hosts the largest old growth and primary forests remains within in the temperate climate zone of Europe. The degree of naturalness of Romania's forests is still exceptionally high in comparison to the rest of (temperate and southern) Europe: Potentially, old growth and primary forests cover an area of more than 500.000 hectares (PRIMOFARO inventory, 2019<sup>7</sup>).

An older Romanian inventory of „virgin forests“ in 2005 (Pin Matra project, Biris & Veen, 2005) has revealed more than 210.000 ha of „virgin“ forests, following a stricter definition.

Only the far north (Scandinavia, European Russia) holds bigger areas of wild and unmanaged forests.

This makes clear: No matter if you refer to the wider definition of natural forest or only consider primary („virgin“) forests: Romania hosts the most important forest treasure of the EU (outside Scandinavia). Forests of this ecological quality are almost extinct in Europe and thus they are of outstanding ecological and scientific value.

Most of these forests composed of mixed beech stands and oak forests in the lowlands, hills and lower slopes of the mountains - and of spruced dominated forest landscapes in the montane and sub alpine levels. The main reason why these forests are still there is the lower intensity of historical industrial exploitation (e.g. compared to the Alps), the low density of human population and their relative inaccessibility.

However, this natural heritage is vanishing rapidly due to intensive logging. Numerous scientists and civil society organisations have been calling on the Romanian government and the EU to take action to halt the loss of these internationally important forest treasures and to preserve these fragile ecosystems on a large scale.

So far all these appeals did not help significantly, even in protected areas such as national parks logging is moving ahead. NGOs and scientific analyses (Knorn & Kuemmerle 2012<sup>8</sup>) reveal that logging also has an increasing negative impact on the integrity of protected areas. This also threatens numerous forest dependent and protected species such as the capercaillie (Mikolas and Tejkal 2016<sup>9</sup>).

According to the PRIMOFARO inventory, More than 300.000 hectares of old growth and primary forests are included in EU's Natura 2000 sites, but this does not result in secure protection as EU legislation is not implemented sufficiently in Romania .

Therefore, also international scientists and NGOs have been calling on the Romanian government und the EU to increase efforts to protect the remaining old-growth and primary forests of Romania<sup>10</sup> - as it should already be the case according to the Natura 2000 program and to international conventions such as the CBD.

In the years after the “Pin Matra” virgin forest inventory was published (2005), Romania's forests suffered from a massive wave of logging. Restitutions of former forest owners, which aallegedly happened largely illegally and in many cases were based upon forged forest ownership papers, scaled up this development.

This large scale of logging continued after Romania's accession to the EU in 2007, when Romania's Natura 2000 sites were declared. In several of the designated Natura 2000 sites such as Sites of Community Interest (SCIs) and Special Protection Areas (SPAs) logging even increased.

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7 Schwarz, U. & Schickhofer, M. (2019): Inventory of Potential Primary and Old-Growth Forest Areas in Romania (PRIMOFARO). Mapping the largest intact forests in the temperate zone of the European Union.

8 Knorn J. & Kuemmerle T. (2012): Continued loss of temperate old-growth forests in the Romanian Carpa- thians despite an increasing protected area network. *Environmental Conservation* 40(2), pages 182–193.

9 Mikolas M. and Tejkal M. (2016): Forest management impacts on capercaillie (*Tetrao urogallus*) habitat distribution and connectivity in the Carpathians. *Landscape ecology journal*, Volume 32, Issue 1, pages 162-179.

10 <https://www.saveparadiseforests.eu/en/200-scientists-and-forest-ecology-experts-call-on-romania-to-take-action-for-paradise-forests/>



Theoretically, “virgin“ forests in Romania have been protected by law since 2008 (Forest Code). In 2012, following to a petition campaign organized by WWF, the Romanian government issued a ministerial order (MO 3397/212) to protect Romania’s „virgin and quasi-virgin“ forests. This legislation also initiated the development of a "National Catalogue of Primeval and Quasi-virgin Forests" and restricted logging of areas which had been mapped by the 2005 Pin Matra inventory: logging was only allowed if the respective Forest Guard confirms that very the forest was not an intact „virgin forest“ any more.

In detail, this Romanian forest protection framework says, that forests that were subject of the study “Inventory and strategy of sustainable management and protection of the virgin forests in Romania – Project Pin – Matra/2001/018”, done by The Dutch Royal Society for Conservation of Nature in cooperation with Romanian Forest Research Institute (ICAS)<sup>11</sup>, “included in the plans for decadal timber harvest as principal products, will be harvested accordingly with the management plan, only based on an approval of the Territorial Inspectorate for Forest and Hunting Regime (ITRSV) which has territorial competences, which is attesting that the stands are not fulfilling the C&I criteria approved by the present order.”

In other words: The Ministerial Order No. 3397 de facto banned logging in forests which were identified as virgin forests by the Pin Matra inventory. Even if the 10 years forest management plan allows timber cutting a virgin forest stand, that forest stand can only be logged if the Forest Guards testifies that this forest does not meet the criteria for identification of virgin and quasi-virgin forests any more.

Unfortunately, this de facto moratorium has been (and is being) ignored almost everywhere in the country. One reason for this was the lack of a compensation scheme for private forest owners. A number of owners fought against the alleged “expropriation”. Since 2017, state resources have been available for the compensation of private forest owners. However, the scheme is complicated, contradictory and the resources for strictly protected virgin forests (functional category T1) are narrowly limited.

Basically, commercial logging in most of Romania’s protected areas is not forbidden. Most of the virgin forests in national are not included in strictly protected core zones. Almost all Romanian national parks do not meet the IUCN criteria of at least 75% non intervention zones and natural or virgin (primary) forests in buffer zones are not protected at all from commercial forest management.

So, logging of old growth and primeval forests continued, also in the so called “Pin Matra” areas and (at a massive scale) in EU’s Natura 2000 sites and national parks.

To sum up: Despite national legal obligations to preserve “virgin and quasi-virgin forests” (Forest Act, Ministerial Orders 3397/2012 and 2525/2016 regarding protection of virgin forests) and EU regulations (Birds Directive 79/409/EEC and Habitat Directive 92/43/EEC), which stipulate protection of natural habitat types and listed species in a good conservation status, logging of virgin and natural forests is omnipresent in Romania.

New legislation that came into force in 2016 (Ministerial Orders Nr. 1417/2016 and Nr. 2525/2016) gave a push to the development of „National Catalogue of Virgin Forests“ but the approval process to populate it is slow (and has been blocked for longer time periods) due to ambiguous sections of the law that can be negatively interpreted by the local forest guards that are responsible to manage studies submitted by interested parties (NGOs, universities, institutes, individual scientists etc). For example, the law requires those who do the mapping and make studies to include information in expert studies which is not public (maps, forest management plans etc). So, if a forest manager is not willing to co-operate, protection will not be achieved.

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<sup>11</sup> Biriş I. & Veen P. (ed.) (2005): Inventory and strategy for sustainable management and protection of virgin forests in Romania. (PIN-MATRA/2001/018). ICAS and KNNV. Web source datasets digital maps: Pădurile virgine din România. Report and maps. <http://www.mmediu.ro/articol/proiect-pin-matra-padurile-virgine-din-romania/2068>.

The Ministerial order 2525/2016 also came up with a new definition of the criteria for virgin forest identification and for procedural settings for the development and submission of expert studies. But due to bureaucracy and lack of cooperation by some forest managers and representatives of competent authorities, the population of the "National Catalogue" started off very slowly.

In 2016, when this very project was initiated, less than 20.000 hectares of „virgin forests“ were included in the „Catalogue“. According to the latest public announcement by the Romanian Ministry for Water and Forests (May 14, 2019), the National Catalogue of Virgin and Quasi-virgin Forests includes 29,063.58 hectares of forests. This represents 0.4% of Romania's total forest cover (approximately 7 million hectares) and around 13% of the virgin and quasi-virgin forest surface identified by the Pin Matra inventory in 2005.

The National Catalogue of Virgin and Quasi-virgin Forests only considers forests for protection which meet rather strict criteria as defined by various Ministerial Orders (latest version by Ministerial Order 2525/2016).

NGOs and scientists criticize that the application process of virgin forest areas for this catalogue is “quite slow and cumbersome” (Biris 2017)<sup>12</sup> and they also argue that there could be much more unidentified natural and primary forests which are still intact or only initially degraded and thus still rich in biodiversity.

At the same time logging of high biological value forests continues. The new Romanian environmental minister, Costel Alexe, confirmed previously leaked figures from the second circle of National Forest Inventory (NFI) about the extremely large scale of illegal logging in Romania. According to the NFI figures<sup>13</sup>, the illegal harvest (20 mio. cubic meters) even exceeds the allowed harvest (18 mio. cubic meters).

There are many reasons why the loss of old growth and primary forests continues; most important issues to be addressed are:

- Strong wood demand from timber processing industry, predominantly from international companies with large processing capacities.
- Growing demand for biofuels.
- Lack of political stability and continuity in Romania.
- Widely spread corruption and breaches of both national and European legislation at all levels. Omnipresent illegal logging practices - such as cutting over quota, cutting without permission, cutting in protected areas etc.
- Lack of law enforcement.
- Weak implementation of the existing national (Forest Code and Nature Protection Law, secondary legislation) and international legal provisions (eg. EU Nature Directives).
- Strong role of the state-owned Romanian forestry company "Romsilva", which focuses almost exclusively on timber production, both in the forest sector and in the management of protected areas.

Another weakness is that forest conservation efforts in Romania have been restricted to strictly defined “virgin forests“. Other close-to-nature forests with high biodiversity value (such as natural forests and old-growth forests) lack effective protection. This means, that provisions from EU's Nature Directives (such as Article 6 from Habitats Directive) are not implemented properly. Thus, the NGOs EuroNatur, Client Earth and Agent Green joined forces and submitted a complaint against the Romanian government at the European Commission in September 2019<sup>14</sup>.

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12 Biriş I.-A. (2017): Status of Romania's Primary Forests. For Greenpeace Romania. Bucharest. <https://storage.googleapis.com/planet4-romania-stateless/2019/07/dd70c748-dd70c748-the-status-of-romania-s-primary-forests.pdf>.

13 <https://www.romania-insider.com/minister-confirms-illegal-logging-report>

14 <https://www.saveparadiseforests.eu/en/eu-commission-urged-to-protect-europes-largest-natural-forests-from-illegal-logging/>

A major weakness in forest protection is the lack of contemporary data about intact natural forest ecosystems in Romania. The „Pin Matra“ inventory from 2005 is outdated and the forests are partly destroyed. A desktop / remote sensing inventory by Greenpeace<sup>15</sup> revealed almost 300.000 hectares of potential primary forests. But the forests were not validated by field visits or historical data.

For this reason, EuroNatur Foundation commissioned a thorough analysis to provide up-to-date and detailed information on the remaining old-growth and primary forests in Romania, including also areas beyond the narrow scope of the Romanian definition of “virgin” forests.

This very project - Virgin & Old Growth Forest in Romania - Safeguarding European Biodiversity Heritage - co-operated closely with EuroNatur Foundation and with the REMOTE project, led by University of Life Sciences Prague<sup>16</sup>.

In September 2019, the results of the (collaborative) mapping efforts were published by EuroNatur Foundation: The final dataset of the „PRIMOFARO“ inventory<sup>17</sup> for entire Romania (based on 12 focus region analysis and additional forest stands outside the Carpathians) reveals the potential existence of more than 525,000 hectares of primary and old-growth forest in Romania.

The PRIMOFARO inventory was developed in close collaboration (such as exchange of data and joint field visits) and partly building on findings of this very project.

Romania’s potential old growth and primary forests represent around 8% of the countries total forest cover. This constitutes the biggest cluster of close-to-nature (old-growth and primary) forest in EU outside Scandinavia. However, only 116,589 hectares (or 55%) of the 2005 Pin Matra1 inventory still appear to be in an intact status. 332,844 hectares (63%) are located within Natura 2000 sites, which are overlapping with national parks. Most of “protected areas” (outside strict non intervention zones) high biological value forests (old growth and primary / virgin forests) are not sufficiently safe from logging yet.

Therefore, EuroNatur Foundation and its partners informed both European Commission, Members of the European Parliament and the Romanian government about the results of PRIMOFARO to enable enhanced efforts for the long term protection of this unique European forest treasure.

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15 Greenpeace CEE Romania (2017): Potential primary forests map of Romania. <https://maps.green-peace.org/project/potential-primary-forests-map-of-romania/>.

16 <https://www.remoteforests.org/index.php>

17 Schwarz, U. & Schickhofer, M. (2019): Inventory of Potential Primary and Old-Growth Forest Areas in Romania (PRIMOFARO). Mapping the largest intact forests in the temperate zone of the European Union. [https://www.saveparadiseforests.eu/wp-content/uploads/2019/10/PRIMOFARO\\_24092019\\_layouted.pdf](https://www.saveparadiseforests.eu/wp-content/uploads/2019/10/PRIMOFARO_24092019_layouted.pdf)





Image 2: Three toed woodpecker, Fagaras Mountains Natura 2000 site. © Matthias Schickhofer

## ***2.2. „National Catalogue of Virgin Forests“: Formal requirements and complications***

In September 2012, the Romania government announced the introduction of the so-called „National Catalogue of Romanian Virgin and Quasi-virgin Forests“. The new instrument was first mentioned in Ministerial Order 3397/2012 which aimed to ensure the comprehensive protection of all Romanian virgin forests. This „Catalogue“ is a pioneering tool in whole Europe, but it is based upon a very complex system of bureaucratic regulations and restrictions which result in several shortcomings.

The latest regulation regarding the implementation of the „National Catalogue of Romanian Virgin and Quasi-virgin Forests“ is ministerial order 2525/2016.

Basically, it defines that any forest owners or qualified experts can submit size and locations of potential virgin and quasi-virgin forests to the respective competent authority, which „will cease conducting forestry works in that area. “

The ministerial order then explains, that „the territorial structure of the central public authority responsible for forestry is required to verify information received from individuals and legal entities or administrator / provider of forestry services for the identification of forest lands that meet the criteria and indicators referred Order of the Minister of environment and forests no. 3.397 / 2012, as amended, and to post on its website a list of these forests, in order to offer the possibility to prepare foundation studies under this order.“

In case a forest owner identifies a virgin forest on the own territory and data from forest management plan confirms compliance with the virgin forest identification criteria, the technical commission in the Ministry for Water and Forests (CTAS) can directly include the forest in the „Catalogue“ without further studies.

If qualified experts identify a potential virgin or quasi-virgin forest, they are obliged to notify local forest authorities, forest owner / manager and prepare a „foundation study“ proofing that the very forest meets the virgin forest identification criteria as defined by the ministerial orders 2525/2106 (amended version) and 3397/2012 (original version). As soon as this notification happens any logging activities within the potential virgin forest area have to be stopped.

Experts („developers“) have to meet strict criteria; otherwise their studies will be rejected by authorities. They must have a university degree in forestry and must meet at least one of the following conditions:

- be certified as a project leader or expert in forest planning CTAP
- be scientist's minimum grade III;
- be academics who work in forestry, ecology and / or biology

These criteria also account for „legal entities“ (such as NGOs), who work together with experts.

Romanian experts express the critique that the dominance of forestry academics is not reasonable, as forest ecologists or biologists are equally (or maybe even better) educated to identify a virgin or quasi-virgin forest.

The developers „will have access to management data and forests for the studies that they must draw up only after prior notification to the owner of the forest and the administrator / provider of forestry services, notice which must be done in writing at least 15 days before work begins.“ If the forest owner is not known or does not co-operate, the local authorities are obliged to assist. The ministerial order also says, that „the development of the study is done in a period not exceeding 90 days from the date proposed for the start of the study.“

However, in reality it often turned out to be difficult and time consuming to get access to forest management plans, if the owner is not willing to co-operate. Also, individual representatives of the forestry authorities did not show much willingness to support the work of the experts and to contribute to the population of the „Catalogue“.

Furthermore the „developers“ are obliged to „provide to the committee the management plans that apply to units included in the study, as current, and with maps and related works executed in the last 30 years.“ If the forest owner / manager „has accurate information, supported by legal documents on cases where forests do not meet certain establishments and indicators contained in the Order of the Minister of Environment and Forests no. 3.397 / 2012, as amended, and if it is accepted by the members of the verification commission, those units will be excluded from the study, without the need for field verification.“

This means: if the forest management plan includes misleading or even wrong information about the qualification (e.g. history or average tree age) of a very forest parcel, it can be excluded from protection without any further field check. This caused several problems during the implementation of the project.

Basically, the developers are obliged to conduct joint field visits with representatives of authorities to verify the „virgin“ status of the forest. However, in some cases, this did not help, as (misleading) data from forest management plans were given superiority by authorities about field findings or scientific research (e.g. by REMOTE partner project).

Especially disputes about average age data from forest management plans caused lengthy back and forth with some Forest Guards. Romanian forest ecology experts also report that some authority representatives rejected old-growth or primary forest parcels because forest plots were described with less than 150 years average age in management plans. These age figures are usually not based upon any scientific research (e.g. dendro-chronological cores) but are often a simple estimation by local foresters, who normally do not have academic education.

Project partners frequently found underestimates of the average tree age of forest parcels in management plans. Probably, only the tree size was considered. This can be strongly misleading, in particular on steep and rocky or dry slopes with bad soil conditions or at higher elevations of mountains. (The oldest beech tree found in the Alps has a diameter of only 73 cm and is only 20 meters high.<sup>18</sup>)

Several studies pre-pared by experts for the National Catalogue of Virgin and Quasi-virgin Forests were rejected by CTAS because the information given by the forest management plans was in contradiction to the results of the experts' study.

In certain cases (e.g. with Boia Mica virgin forest) the expert partners of this project liaised with researchers from REMOTE project and had access to a large pool of scientific data from dendrochronological analyses. The data from numerous tree cores showed partly exceptional age (400 years or older). Nevertheless, the responsible forest guard rejected the foundation study and insisted that only the rough (and far too low) age estimates from the forest management plan should be considered.

*(At the time of editing this project report the study about Boia Mica is still not accepted by the ministerial commission).*

Another field of critique is the restrictive and narrow way „virgin and quasi-virgin“ forests are defined in Romanian legislation. The Ministerial Order 2525/2016 sets criteria for the identification of virgin and quasi-virgin forests to be included in the catalogue. These criteria have been amended slightly by ministerial order 2525/2016.

Forest experts have been questioning the scientific accuracy of these criteria (Biris 2017) because they mainly describe the climax phase of natural forest development with high volumes of dead wood and large number of tall and old trees. The criteria defined by the Ministerial Order require (among other strict limitations) “the frequent presence of dead wood, standing and on the ground, in different decay classes”.

Additionally, Romanian forest ecology experts report that these criteria have been applied in a very restrictive and discriminatory interpretation by the Technical Commission of the Ministry for Water and Forests (CTAS). Criteria such as “frequent presence of dead wood” and the “age of trees” have been used to exclude natural forests not meeting this forest image (e.g. in younger development phases or in extreme expositions) from protection. Some authorities did argue there was “not enough dead wood” in the very forest parcel; therefore forests were rejected on these strict grounds.

To sum up:

- The „National Catalogue of Virgin Forests“ is being populated at a very slow rate.
- It is based upon disputed and very rigid criteria and Romanian experts and NGOs report about massive bureaucratic obstacles and hurdles from authorities and the Ministry for Water and Forests in the course of the approval process for submitted forests areas.
- The latest published available datasets includes 1,430 forest parcels with a total surface of 29,063.58 ha (May 2019)<sup>16</sup>.

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<sup>18</sup> [https://www.kalkalpen.at/de/Aelteste\\_Buche\\_Kontinentaleuropas\\_entdeckt](https://www.kalkalpen.at/de/Aelteste_Buche_Kontinentaleuropas_entdeckt)





Image 3: Primary mountain spruce forest in Curpanului valley, Fagaras Mountains Natura 2000 site. © Matthias Schickhofer



Image 4: Primary beech forest with impressive methuselah trees (more than 400 years) in Boia Mica valley, Fagaras Mountains Natura 2000 site. © Matthias Schickhofer

## 3. Main Part

### 3.1. Aims of the project

The main aims of the project were:

Overall Objective :

- Protection of all high conservation value primary forest remains of Romania by adding them to the National Catalogue of Virgin Forests.

Project Objectives:

1. Conduct a comprehensive inventory of the primary forest remains of Romania:
  - Identification and mapping of potential primary forest areas (remote sensing methods)
  - Re-assessment of existing inventory data (Pin Matra inventory 2005)
  - In-depth check of first selection of potential sites (high resolution satellite data, forest maps)
  - Conduct field checks of a selection of important (and acutely threatened) potential primary forest areas and verification of their intact status.
2. Convince the Romanian Governmental to apply a (temporary) logging moratorium for all areas identified as potential primary forests until they are evaluated and checked by authorities.
3. Populate the National Catalogue of Virgin Forests as fast as possible in order to avoid further losses of unprotected important primary forest stands. Thus the number of primary forest areas checked and documented by field work as well as submission of expert studies about primary forest areas for inclusion into the Virgin Forest Catalogue in 2017 has to be enlarged and accelerated.

It turned out that with the given resources the project aims had to be re-arranged and implemented in collaboration with partner organizations due to budget constraints.

We realized that project objective 1 (comprehensive inventory of primary forests) required either more huge budgets (several 100.000 Euro to purchase high resolution satellite images covering whole Romania) or to invest months of work by experts to conduct the analyses visually based upon freely accessible digital satellite data. Therefore, this work was conducted in partnership with EuroNatur Foundation.

Finally, the PRIMOFARO<sup>19</sup> inventory of Romania's old growth and primary forests was published in September 2019. It revealed that Romania holds still more than 520.000 ha of potential old growth and primary forest. This goes beyond the strict and narrow definition of „virgin and quasi-virgin“ forests as defined by Romanian legislation and includes also other high biodiversity value forests with some minor human impacts.

Objective 2 was followed in partnership with the NGOs Agent Green and EuroNatur. Unfortunately, the previous Romanian government (which lost majority in October 2019) did not show any intention to improve protection of valuable forests.

The main work within the project was focussed on objective 3 - populate the National Catalogue of Virgin Forests. Two Romanian expert teams were doing numerous field visits for promising forests, prepared expert

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<sup>19</sup> Schwarz, U. & Schickhofer, M. (2019): Inventory of Potential Primary and Old-Growth Forest Areas in Romania (PRIMOFARO). Mapping the largest intact forests in the temperate zone of the European Union. [https://www.saveparadiseforests.eu/wp-content/uploads/2019/10/PRIMOFARO\\_24092019\\_layouted.pdf](https://www.saveparadiseforests.eu/wp-content/uploads/2019/10/PRIMOFARO_24092019_layouted.pdf)



studies, communicated with both forest managers, local authorities and the „Technical Commission“ (CTAS) with the Ministry for Water and Forest. This included dealing with bureaucratic burdens and a tiring back and forth between a ministerial commission, local forest guards and included numerous repetitive field visits in several cases. In many cases the back and forth went over periods of a year or longer. These obstacles consumed considerable shares of the project budget.



Images 5: Fungi are of key importance in forest ecosystems. The diversity of fungi in primary and old-growth forests are still hidden secrets. © Rainer Luick

## **3.2. Main Results**

Finally, in December 2019, 5.200 ha of „virgin and quasi-virgin“ forest have been mapped by experts teams of the DBU-funded project „Virgin & Old Growth Forest in Romania - Safeguarding European Biodiversity Heritage“ and respective „foundation studies“ have been submitted to the Romanian competent authorities for approval to be included into the „National Catalogue of Virgin and Quasi-virgin Forests“.

This total acreage of all mapped forests together is roughly the size of a small national park in Western Europe.

In total, in December 2019 2.034 ha of forests have been approved by authorities (not all of these forest areas are yet listed in the „Catalogue“). The others are still waiting to be approval by the authorities (December 2019).

**In order to identify forests with a potential to meet the criteria as defined by Ministerial Order 2525/2016 the following steps were taken:**

- Analyse available digital maps (such as Pin Matra study) for potential primary forests with high scientific and / or biodiversity value.
- Collect additional digital data from experts and external partners such as EuroNatur („PRIMOFARO“ project), University of Life Sciences / Prague (REMOTE project), Romanian scientists and regional experts about localization potential primary forest areas.
- Exchange information with experts also pursuing mapping activities such as WWF and Greenpeace.
- Consult forest administrations and forest officials in focus areas.
- Receive information from conservationist minded foresters.
- Conduct numerous field trips to verify the status of the forests on the ground.

**The overall searched areas are much larger than the mapped forest stands, because in several cases local forest authorities and / or ministerial officials rejected the proposed forests or forests turned out to have suffered from human impacts (incl. deliberate „panic“ cuttings to prevent protection). In total the searching areas for still existing „virgin and quasi-virgin“ forest comprised ca. 15.000 ha.**

**Table 1 shows an overview of studies of virgin and old-growth forests for inclusion in the national catalogue and status.**

**In the following chapters the detailed results of the two assigned teams - Team Fodor and colleagues as well as Team Cornei and colleagues - are displayed.**

**Table 1: Overview of studies of virgin and old-growth forests for inclusion in the national catalogue (status December 2019).**

No	Name of the study / area	Size of the area (hectare)	Status	
			Study submitted	Study approved by authorities
1	Valea Rașca Mare. F.D. Mehadia	98	v	●
2	Pârâul Mehadica. F.D. Mehadia	80	v	●
3	Culmea Varniței. F.D. Rusca Montana	89	v	●
4	Dealul Negrii. F.D. Rusca Montana	188	v	●
5	Valea Padeș. F.D. Ana Lugojana	150	v	●
6	Pârâul Fântânelor – Pârâul Bulvanului. F.D. Ana Lugojana	81	v	●
7	Coadă Bradului, Covasna	109	v	
8	Piatra Soimului, Covasna	57	v	●
9	Coltii Balei, Buzau	306	v	●
10	Colaceni, Comanesti	85	v	
11	Lespezi, Comanesti	153	v	
12	Merisor, Comanesti	34	v	
13	Paltinis, Comanesti	92	v	
14	Fabrica veche, Tg. Ocna	94	v	
15	Slanicel, Tg. Ocna	56	v	
16	Sararie, Tg. Ocna	109	v	
17	Valea Curpanului, Valcea	196	v	●
18	Fata Buna, Valcea	111	v	●
19	Oltet, Polovragi	137	v	
20	Paraul Dracului, Polovragi	79	v	●
21	Piatra Closani/Pades, Domogled*	494	v	●
22	Vișa – Vultur, Teregova	170	v	●
23	Pârâul Ursului, Teregova	33	v	●
24	Coadă Lacului, Teregova	65	v	●
25	Dobre, Teregova	152	v	●
26	Pusta, Teregova	155	v	●
27	Sterminoasa, Valcea	200	v	
28	Boia Mica, Valcea	900	v	
29	Crasna, Maramures	400	v	●
30	Muncelu, Maramures	143	v	●
31	Preluca Jneapan, Maramures	127	v	●
32	Oituz-Calaslau, Covasna	65	v	
	<b>Total</b>	<b>5.208</b>	<b>2.033</b>	<b>3.175</b>

### 3.2.1. Team Fodor et. al. (University Oradea)

#### 3.2.1.1. Summary of mapping results

**Table 2: Overview about forest areas mapped (2017 - 2018; status: December 2019)**

Quasi-virgin forests	Area	Status
Dealul Negrii – Rusca Montană F.D.	188 ha	Included in the Catalogue
Culmea Varniței – Rusca Montană F.D.	88.86 ha	Included in the Catalogue
Valea Padeș – Ana Lugojana F.D.	150.48 ha	Included in the Catalogue
Pârâul Fântânelor- Pârâul Bulvanului – Ana Lugojana F.D.	81.37 ha	Included in the Catalogue
Valea Râșca Mare – Mehadia F.D.	97.87 ha	Included in the Catalogue
Pârâul Mehadica – Mehadia F.D.	79.77 ha	Included in the Catalogue
Total	<b>686.35 ha</b>	

#### **General impressions:**

Concerning the interaction with forest administration, the team reported about a „relatively good cooperation“ but experienced heavy burdens by excessive formalism in terms of permits and papers.

The main problem appeared in conjunction with the approval process in the Technical Commission in the Ministry for Water and Forests (CTAS), where the project partners were confronted with massive burdens by formalism.

In particular, the over-rigid interpretation of the criteria for the identification of primary forests and the exclusive adoption of data from forest management plans, as well as the refusal to take into account data from the field reality, was a serious obstacle to the implementation of this project.

The representatives of forestry administrations seemed to pursue economic goals. Nature conservation obligations are generally perceived as more annoying. However, this philosophy is unhelpful in times of climate and environmental crisis when the conservation of high carbon and biodiversity value forests is ranking very high in the public interest.



### 3.2.1.2. Mapped forest areas in period 2017-2018

(Report by Prof. Dr. Ecaterina Fodor)

#### Virgin- / quasi-virgin forest areas “Culmea Varniței - Dealul Negrii” forests in Poiana Ruscă Mountains (Forest District Rusca Montană)

The management units are situated in the Production Unit II Pleșu Negrii, owned by the State and managed by ROMSILVA (Forestry District Caraș Severin, Forestry Subsidiary Rusca Montană).

After the consultation of management plans and field work we conclude that the area which can be proposed to be included in the old growth forests Catalogue is a part of the Pădurea Pleșu reserve, precisely the forest stands from “Culmea Varniței - Dealul Negrii”, which complies with the official criteria for PV and CVP (The Order of the Ministry of Environment and Forests no. 3397/2012).

From a Total area: 1980,44 ha of the reserve, the final area proposed for inclusion into the „National Catalogue of Virgin Forests“ after several discussions with authorities and forest managers occupies **276.86 ha**.

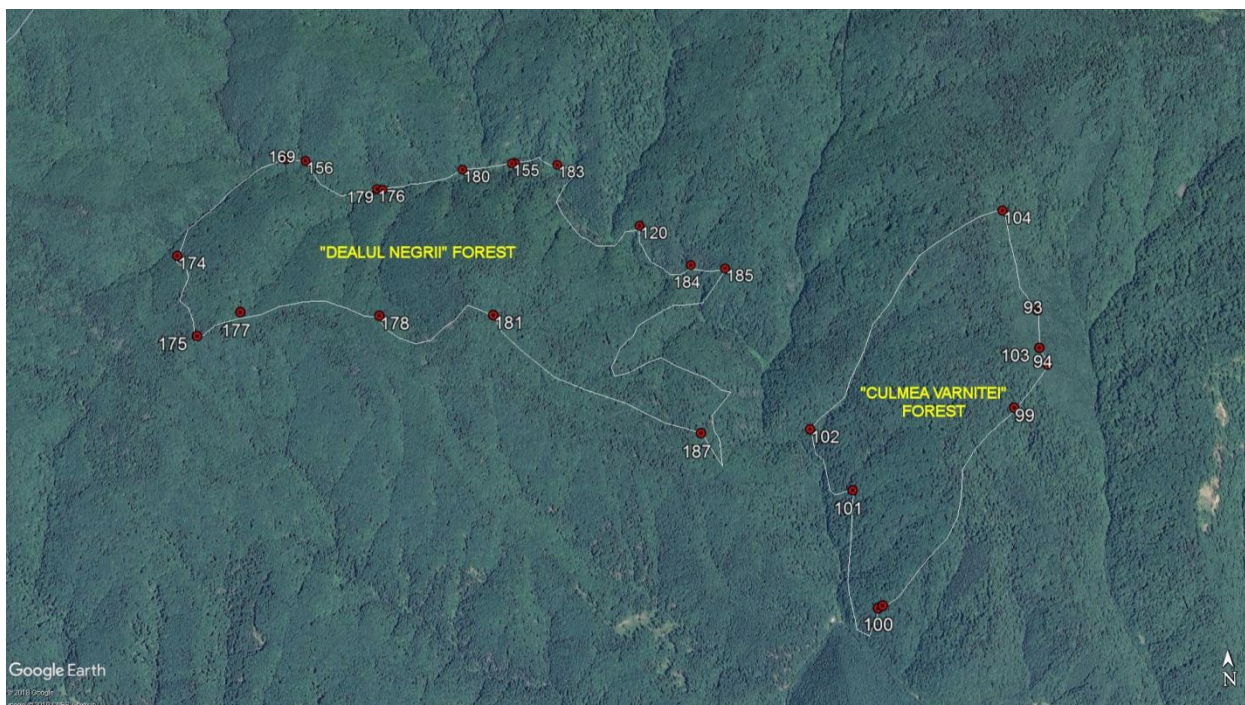


Fig. 1 Overimposed satellite map of the forests designated as quasi-virgin forests from Pădurea Pleșu reserve, F.D. Rusca Montană (Source: Google Earth / CNES / Airbus)

**Virgin- / quasi-virgin forest area:**  
**“Culmea Varniței” Forest - 88.86 ha**

**Virgin- / quasi-virgin forest area:**  
**“Dealul Negrii” Forest - 188.4ha**

Among the observations performed during these last visits, one important biodiversity and naturalness group was in focus, wood inhabiting fungi.

The wood inhabiting fungi, both sapro-parasites and pathogens establish diverse communities within the forest stands. Among observed species are: *Auricularia auriculae iudae*, *Cerrena unicolor*, *Fomes fomentarius*, *Fomitopsis pinicola*, *Ganoderma applanatum*, *Hypoxylon fragiforme*, *Oudemansiella mucida*, *Polyporus tuberaster*, *Polyporus umbellatus*, *Sparassis crispa*, *Trametes versicolor*, *Trametes gibbosa*, *Xylaria polymorpha*, *Meripilus giganteus*, *Pseudohydnum gelatinosum*, *Schizophyllum commune*, *Hericium*

coralloides, *Pleurotus ostratus*, *Armillaria ostoyae*, *Armillaria mellea*, *Picnoporus cinnabarinus*. There are also species considered to indicate high degree of naturalness among which: *Sparassis crispa*, *Meripilus giganteus*, *Polyporus lentus* and *Polyporus umbellatus*.

Among protected insect species of the area, one is particularly important, the IUCN Red List lepidopteran *Nymphalis vaualbum*.

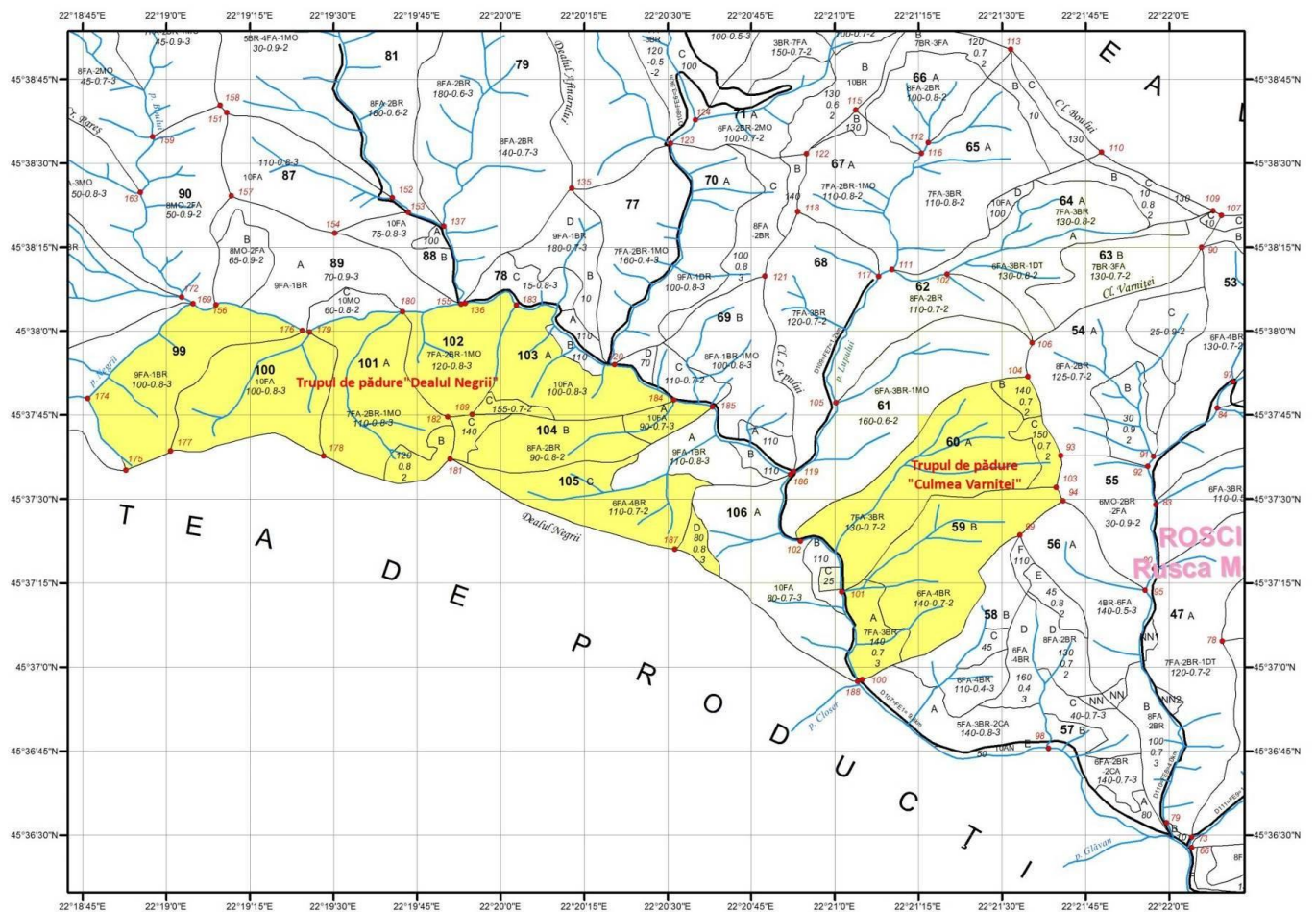


Fig. 2: Topographical map (based on the map included in the management plan) “Culmea Varnitei” and “Dealul Negrii”





Images 6: Aspects from quasi-virgin forests included in Pădurea Pleșu reserve © Ecaterina Fodor et al



### 3.2.1.3. Mapped forest areas in period 2018-2019

During the period 2018-2019 the Oradea team mapped four important virgin-/quasi-virgin forest areas in western Romania and proposed them for the Catalogue the following areas. The areas are:

1. **“Valea Padeș” forest (Padeș Valley)** - Production Unit III Padeș, F.D. Ana Lugojana, F.S. Timiș - **150.48 ha**
2. **“Pârâul Fântânelor – Pârâul Bulvanului” forest (Fântânelor Creek, Bulvanului Creek)** – Production Unit IV Cornet, F.D. Ana Lugojana, F.S. Timiș - **81.37 ha**
3. **“Valea Rașca Mare” forest (Rașca Mare Valley)** - Production Unit III Mehadica, F.D. Mehadia, F.S. Caraș-Severin - **97.87 ha**
4. **“Pârâul Mehadica” forest (Mehadica Creek)** - Production Unit III Mehadica, F.D. Mehadia, F.S. Caraș-Severin - **79.77 ha**

All areas are state owned forests and are dominated by beech or consist of pure beech forests.

#### 1. “Valea Padeș” forest - 150.48 ha

The designated area (150.48 ha) is situated in the proximity of Nădrag commune, Timiș County (Fig. 2 and 3). It complies with semi-old growth forests criteria after verification of the management plans over the last 30 years and field observations.

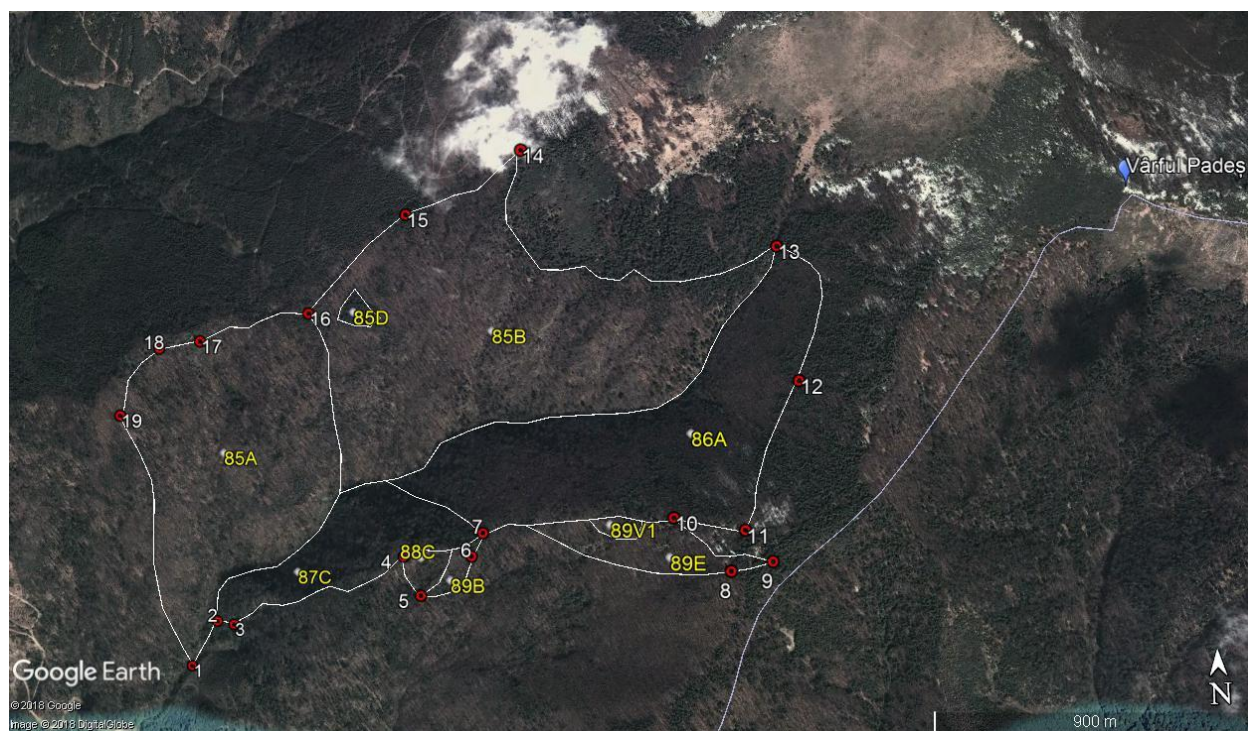


Fig. 3: Over-imposed satellite map of the Valea Padeș forest with locations of the designated management units (Source: Google Earth / Digital Globe)





Images 7: Aspects from Valea Padeș forest © Ecaterina Fodor et al

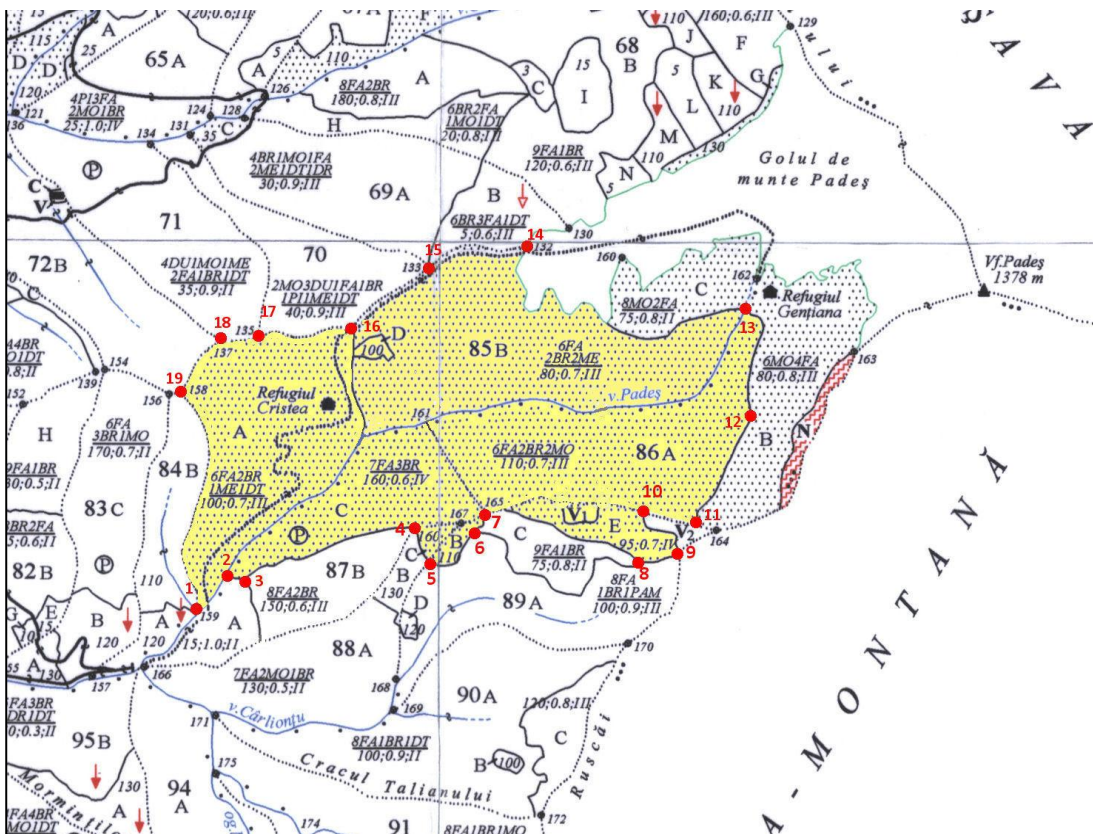


Fig. 4: Topographical map (based on the map included in the management plan) of the Valea Padeș area

The area is crossed by Padeș creek which creates a relatively humid environment facilitating the development of spectacularly large trees: majestic individuals of *Fagus sylvatica*, *Acer pseudoplatanus* and *Abies alba* were observed. The area is characterized also by high diversity of macromycetes and myxomycetes.

Forest stands vegetating uphill are exposed to stressful factors such as rock outcrops and thin soil layer, being dominated by beech and fir.

Average age of tree populations is around 100 years, with older individual if one considers the remarkably large individuals. Other characteristics consist in uneven age structure, good natural tree recruitment, the presence of litter and decomposing wood, lack of anthropogenic pressure (roads or felling).

Among the rare and interesting invertebrates encountered is the millipede *Pachyiulus hungaricus*.



## 2. “Pârâul Fântânelor – Pârâul Bulvanului” forest - 81.37 ha

The designated area (81.37 ha) is also situated in the proximity of Nădrag commune, Timiș County. The area is included in Production Unit IV Cornet covering an area situated in the Western part of the Poiana Ruscă Mountains. The landscape is characterized by rugged terrain, deep valleys converging to Nădrag depression.

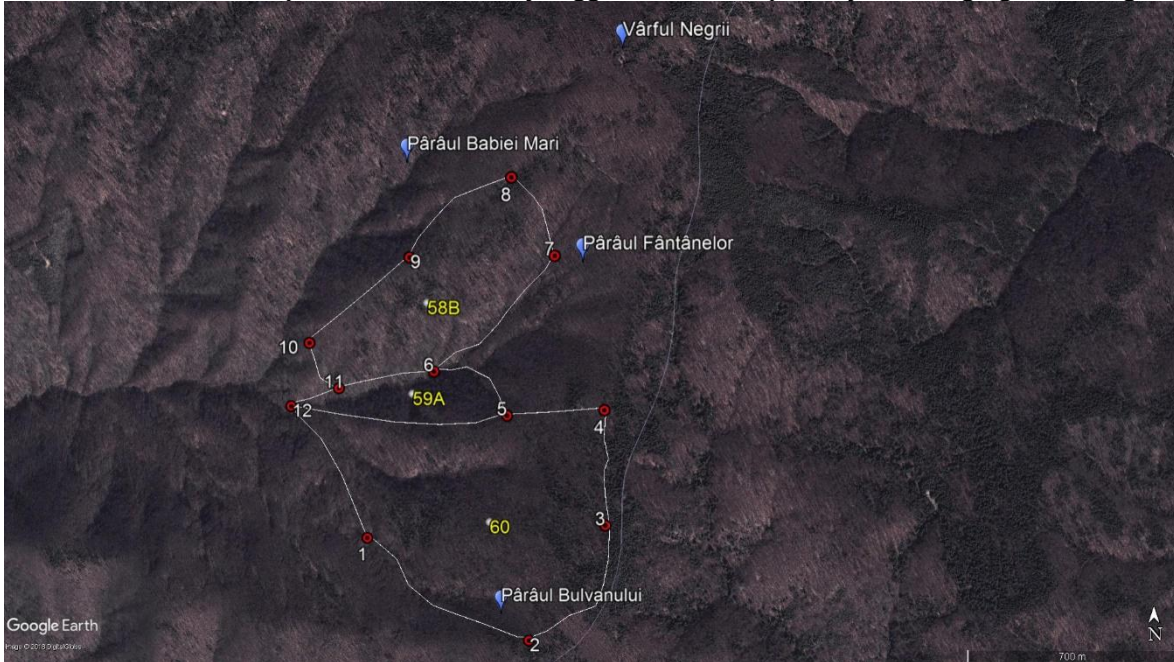


Fig. 5: Over-imposed satellite map of the Pârâul Fântânelor – Pârâul Bulvanului forest with locations of the designated management units. (Source: Google Earth / Digital Globe)

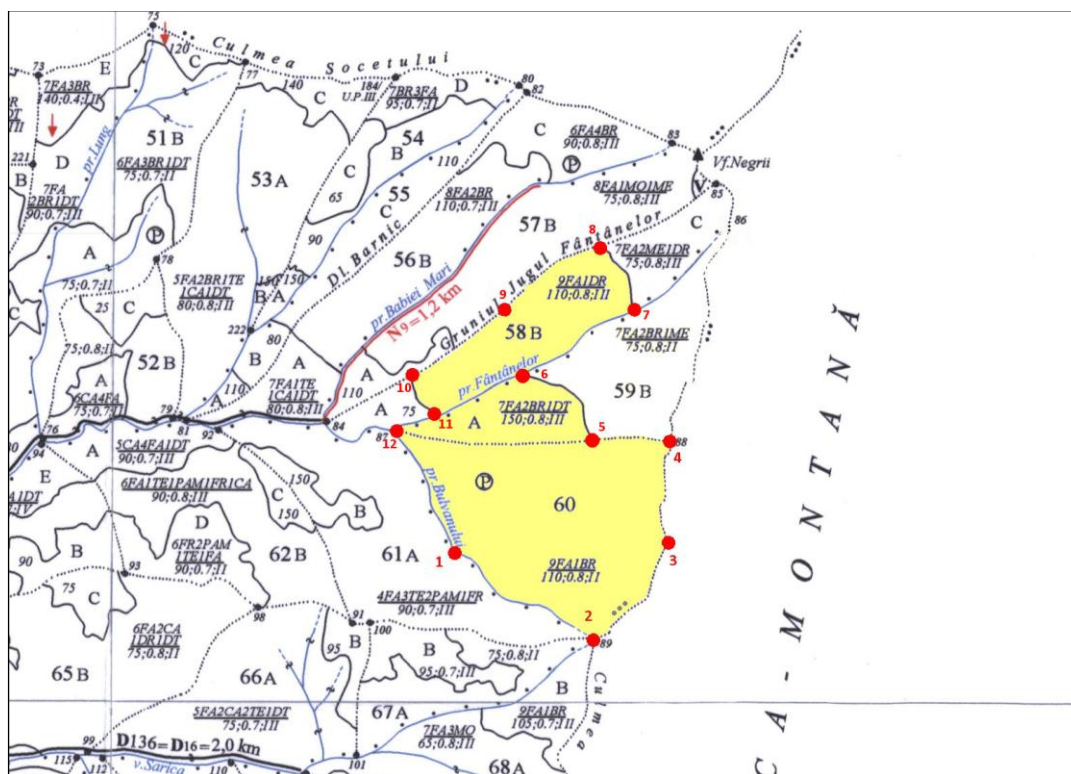


Fig. 6: Topographical map (based on the map included in the management plan) of the Pârâul Fântânelor – Pârâul Bulvanului forest



The area is covered by forests dominated by beech and the participation of spruce and fir in various proportions. The uneven age structure is characterized by the existence of remarkably large trees judging after their stems' exceptional diameters (over 1 m) and heights. The presence of fir indicates a high conservation value forest ecosystem type found in Southern Europe from Balkans to Iberic Peninsula known as highly productive and complex. Tree recruitment is abundant and mainly from seeds indicating stability of the ecosystem. The presence of fallen logs and dead standing trees as well as litter contribute to structural complexity.

The forests comply with semi-old growth forests criteria after verification of the management plans over the last 30 years and field observations.

### 3. "Valea Rașca Mare" forest - 97.87 ha

The designated area 97.87 ha is placed in the proximity of Mehadica commune, Caraș-Severin County. The forest proposed to be included in the Catalogue geographically is situated in South-Eastern Semenic Mountains area, along Mehadica creek which is an affluent of Belareca River. At the Northern limit of the designated area raises Nerganița peak (1220.69 m).

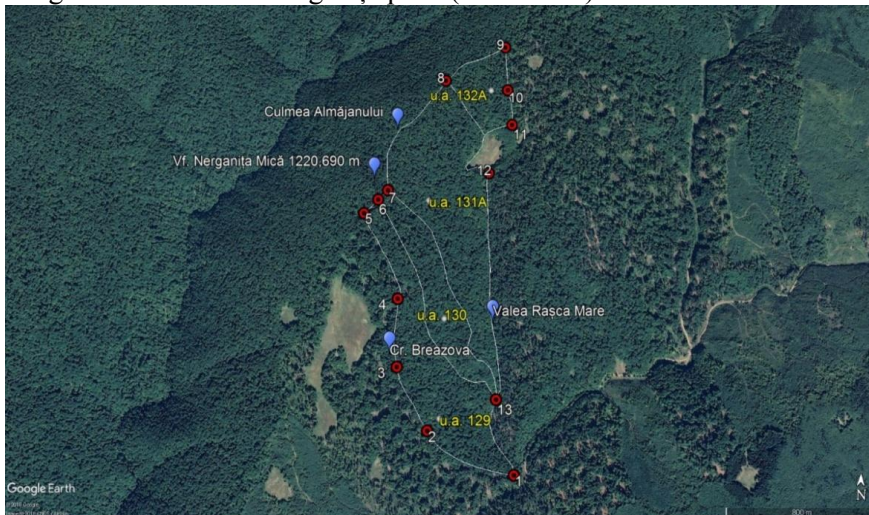


Fig. 7: Overimposed satellite map of the Valea Rașca Mare forest with locations of the designated management units. (Source: Google Earth / CNES / Airbus)



Image 8: Valea Râșca Mare forest © Ecaterina Fodor et al





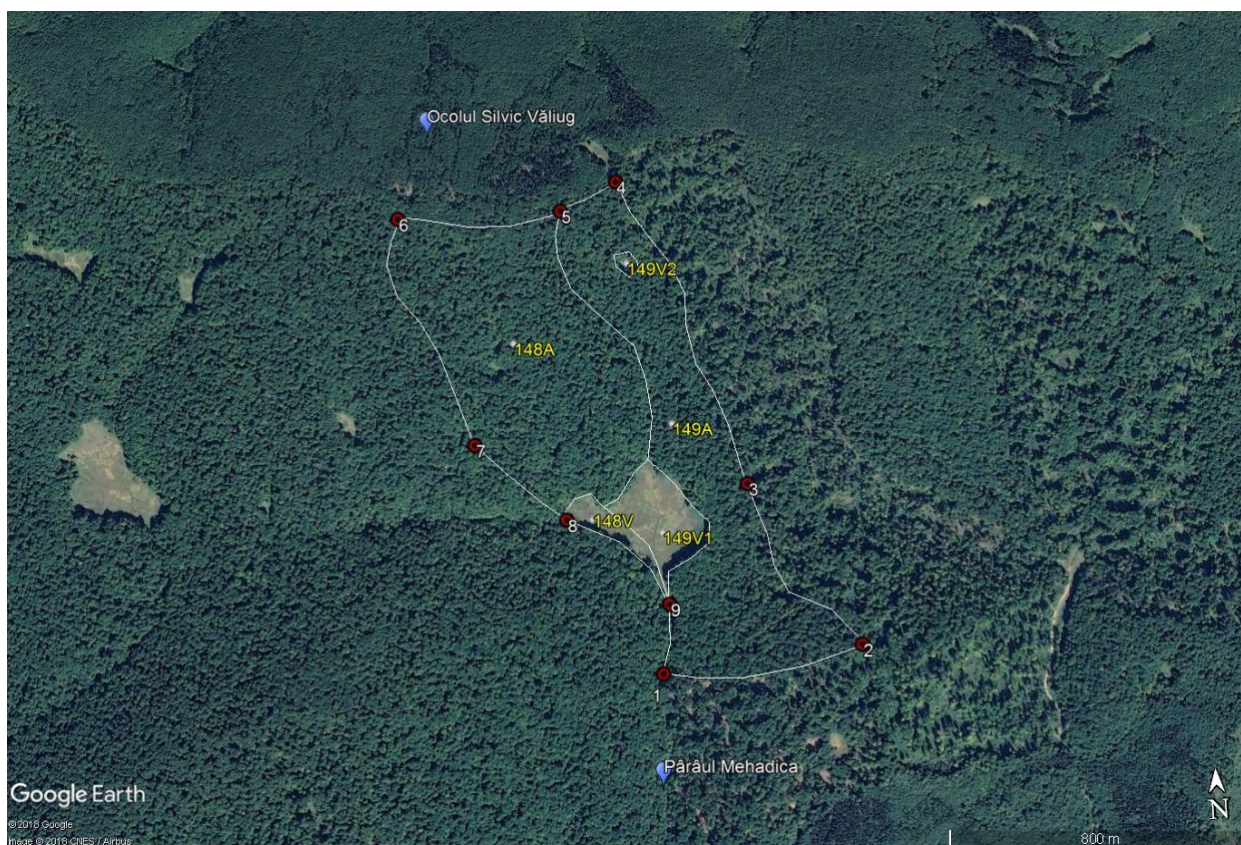


Fig. 9: Overimposed satellite map of the Pârâul Mehadica forest with locations of the designated management units. (Source: Google Earth / CNES / Airbus)

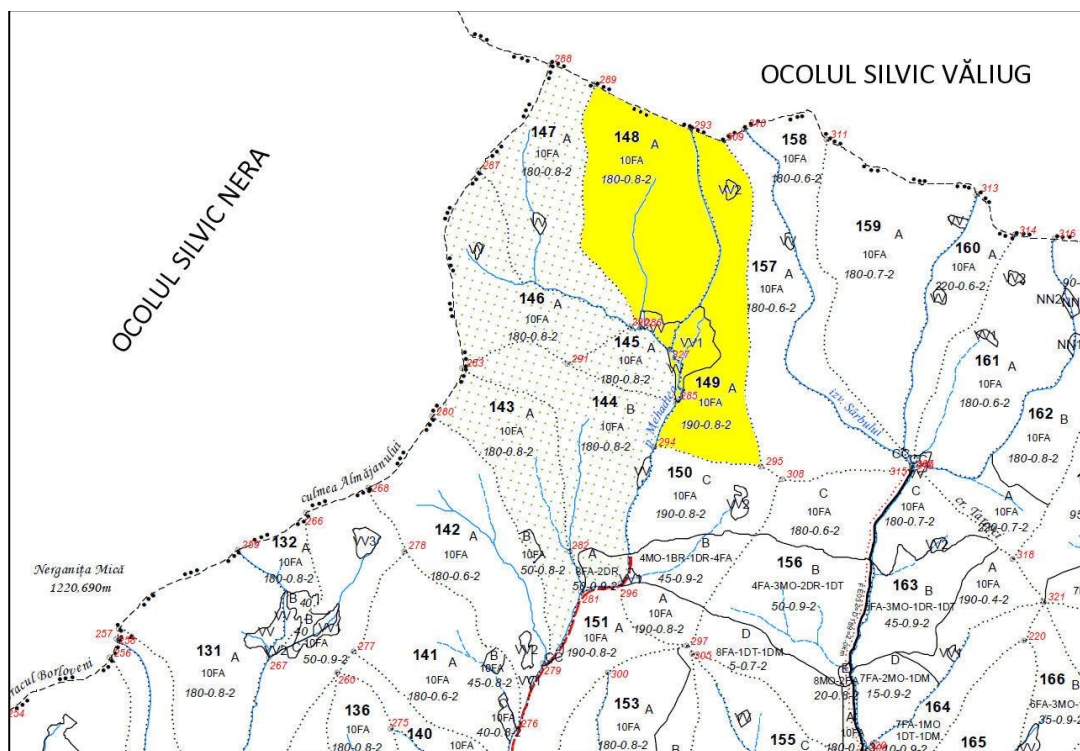


Fig. 10: Topographical map (based on the map included in the management plan) of the Pârâul Mehadica forest.

Forests are unevenly aged with average values in the range 70-190 years and composed of beech (pure beech forest stands). The area includes an open area, a natural, large forest gap (which can be seen on the satellite map). Remarkably tall trees were observed (over 35m).



The area is crossed by Mehadica creek which establishes a more humid topoclimate facilitating the development of vigorous beech trees. Satellite map shows that the designated area presents a continuous forest cover but it is surrounded by areas with rather intensive logging. As a consequence, an old logging strip is still visible at the limit with the neighboring Forest District Văliug. The covered area is small and in concordance with law specifications concerning the admitted areas with human interventions in forests eligible to be included in the Catalogue. This area is important because it will extend already protected forests from Izvoarele Mehadiicii site, with similar tree composition and age.

The forests comply with quasi-virgin forests criteria after verification of the data from management plans over the last 30 years and field observations.

All the presented areas were admitted as quasi-virgin forests by the Technical Commission of the Ministry of Waters and Forests in June 2019 (but not yet published in the Catalogue).

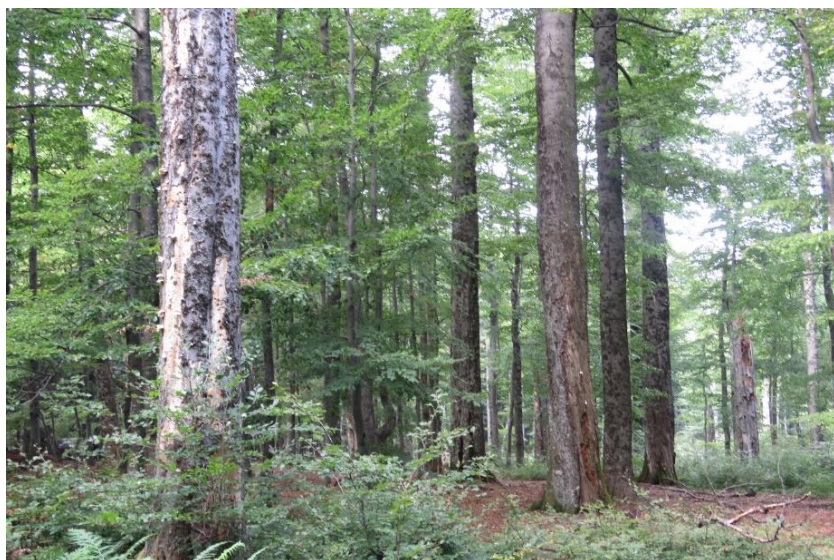


Image 9. Pârâul Mehadica Forest, © Ecaterina Fodor et al



Image 10. Pârâul Fântânelor – Pârâul Bulvanului forest, © Ecaterina Fodor et al

### **3.2.2. Results: Team Cornei et. al.**

(Team members: Constantin Ciornei, Viorel Butnaru, Ion Holban)

#### **Introduction statement (by Ion Holban):**

It is important to analyze how the Catalogue of Virgin Forests is populated.

There are two types of entries in Catalogue:

- ones that are approved automatically by CTAS every 10 years when new Management plans are generated
- and the others are foundation studies, like the ones we do.

The difference between the two is that entries via new Management plans are automatically approved by ministerial commission CTAS while foundations studies have to be done by a „qualified“ scientist and need to be approved by both the Forestry Guard and the Ministry, before CTAS.

While sites from the new management plans are „internal“ jobs where the owners and a local commission decide what to include, the needed studies are much more science-based and also unfortunately taking years to be approved.

So, we are in a strange situation that forest management plans by office workers with almost no scientific background (just BSc in Forestry) are 100% approved, while foundation studies by scientists, PhDs and professors are often rejected..

After analyses of the forests included in the National Catalogue via foundation studies there are two main points painfully obvious:

1. There are *no* „virgin“ forests in the Catalogue approved via foundation plans. All of the 6,947 ha of virgin forests from the Catalogue are the ones submitted via management plans.
2. There are only 13 studies comprising of 26 forests accepted in the Catalogue in the last 4 years via Foundation studies, with a total of 4,808 ha of quasi-virgin forests, as detailed below:

1 study accepted in 2016, containing 5 forests with a total of 240 ha  
2 studies accepted in 2017, containing 2 forests with a total of 964 ha  
6 studies accepted in 2018, containing 14 forests with a total of 2914 ha  
4 studies accepted in 2019, containing 5 forests with a total of 688 ha

So while the Ministry is announcing that they are working to populate the Catalogue, they only really approved 4808 ha in almost 4 years. That's only 16,5% of the Catalogue. The other 83.5 % of the 29,063 ha have been automatically included in management plans with no contribution from the Ministry.

Pusta, Dobre, Crasna, Paraul Dracului and (potentially) Sterminoasa - that's an extra 914 ha from our project in the National Catalogue:

Total areas submitted by Team Cornei: 4392.68 ha  
Forests approved and in the Catalogue: 503.29 ha  
Forests approved this month, but not yet in the Catalogue : 913.96 ha  
Forests approved last year, but not in the Catalogue: 306.48 ha  
Total forests approved: 1723.73 ha  
Forests still outstanding: 2668.95 ha

Unfortunately, the most valuable primary forest of Boia Mica valley is still not yet accepted (December 2019; one year after submission).

**Table 3: Overview about forests mapped and submitted by Team Cornei et al (2017 -2018)**

<b>Studies submitted in 2017:</b>					
Forest name	Initial Area (ha)	Revised (ha)	Commiss. with F.G.	Appr. by F.G.	Approved by the Ministry
Coadă Bradului, Covasna	109	51	Yes	Yes	Currently under revision
*Piatra Soimului, Covasna		57,2	Yes	Yes	Yes, in the Catalogue 14.09.18
*used to be part of Coadă Bradului, but this forest has been split into two bodies					
Coltii Balei, Buzău	306,48	306,48	Yes	Yes	Acpt., but not in Cat.
Colaceni, Comanesti	85,43	85,43	Yes	Yes	Under revision
Lespezi, Comanesti	153,27	153,27	Yes	Yes	Under revision
Merisor, Comanesti	34,15	34,15	Yes	Yes	Under revision
Paltinis, Comanesti	91,59	91,59	Yes	Yes	Under revision
Slanicel, Tg. Ocna	56,48	56,48	Yes	Yes	Under revision
Fabrica veche, Tg. Ocna	94,22	94,22	Yes	Yes	Under revision
Sararie, Tg. Ocna	108,98	108,98	Yes	Yes	Under revision
Tiganca, Tg. Ocna	53,84	53,94	Yes	No	no
Valea Curpanului, Valcea	196,3	120,8	Yes	Yes	Yes, in the Catalogue Aug 18
Fata Buna, Valcea	111,4	53,4	Yes	Yes	Yes, in the Catalogue Aug 18
Oltet, Polovragi	137,27	137,27	Yes	Yes	Currently under revision
Paraul Dracului, Polovragi	78,59	58,21	Yes	Yes	Acpt. (10/19), but not in Catalogue
Piatra Closani/Pades, Domogled*	493,62	493,62	Yes	Yes	Currently under revision
*Piatra Closani will be split into 2 bodies, as per request from Forest Guard					
<b>Total area mapped in 2017:</b>		<b>1956.04 ha</b>	57.2+306.48+53.21+120.8=537		
<b>Studies submitted in 2018:</b>					
Forest name	Initial Area (ha)	Revised (ha)	Status	Appr. by F.G.	Approved by the Ministry
Vișa – Vultur, Teregova	170	177,91	Commission Nov 18	Yes	Yes, in the Catalogue
Pârâul Ursului, Teregova	33	33,38	Commission Nov 18	Yes	Yes, in the Catalogue
Coadă Lacului, Teregova	65	60	Commission Nov 18	Yes	Yes, in the Catalogue
Dobre, Teregova		152,29	Commission Nov 18	TBC	Acpt. (10/19), but not in Catalogue
Pusta, Teregova *	330	155,37	Commission Nov 18	TBC	Acpt. (10/19), but not in Catalogue
* this study was separated into 2 studies: Dobre and Pusta, as per the request from Forest Guard					
Stermioasa, Valcea	200	167,5	Sent to F.G. Dec 18	No	Acpt. (10/19), but not in Catalogue
Boia Mica, Valcea	900	974,6	Sent to F.G. Dec 18	No	Currently under revision



Crasna, Maramures	400	380,59	Sent to F.G. Dec 18	Yes	Acpt. (10/19), but not in Cat.
Muncelu, Maramures	143,38	143,38	Sent to F.G. Dec 18	Yes	Currently under revision
Preluca Jneapan, Maramures	126,92	126,92	Sent to F.G. Dec 18	Yes	Currently under revision
Oituz-Calaslau, Covasna	65	64,7	Sent to F.G. Dec 18	TBC	Currently under revision
<b>Total area mapped in 2018:</b>		<b>2436.64 ha</b>			
<b>Total area mapped in 2017 – 2018:</b>		<b>4392.68 ha</b>			

### 3.2.2.1. Forests mapped by Ciornei team in 2017

In total 15 forests have been submitted up to December 2017 with a total area of 2052 ha. One of these as virgin forests (56 ha), 14 of these as quasi-virgin (1996 ha).

**Table 4: Forests mapped in the year 2017:**

4	<b>Studies already submitted:</b>					
5						
6	<b>Forest name</b>	<b>Surface (ha)</b>	<b>Pin Matra</b>	<b>Virgin or Quasi</b>	<b>Date submitted</b>	<b>Comission</b>
7	<u>Coadă Bradului, Covasna</u>	109	<u>Yes</u>	Q	26.10.2017	05/12/17
8	<u>Colții Balei, Buzau</u>	306,48	<u>Yes</u>	Q	31.10.2017	07/12/17
9	<u>Colaceni, Comanesti</u>	85,43	<u>No</u>	Q	27.11.2017	
10	<u>Lespezi, Comanesti</u>	153,27	<u>No</u>	Q	27.11.2017	
11	<u>Merisor, Comanesti</u>	34,15	<u>No</u>	Q	27.11.2017	
12	<u>Paltinis, Comanesti</u>	91,59	<u>No</u>	Q	27.11.2017	
13	<u>Slanicel, Tg. Ocna</u>	56,48	<u>No</u>	<u>Virgin</u>	27.11.2017	
14	<u>Fabrica vechi, Tg. Ocna</u>	94,22	<u>No</u>	Q	27.11.2017	
15	<u>Sararie, Tg. Ocna</u>	108,98	<u>No</u>	Q	27.11.2017	
16	<u>Tiganca, Tg. Ocna</u>	53,84	<u>No</u>	Q	27.11.2017	
17	<u>Valea Curpanului, Valcea</u>	196,3	<u>Yes</u>	Q	04/12/17	
18	<u>Fata Buna, Valcea</u>	53,4	<u>Yes</u>	Q	04/12/17	
19	<u>Oltet, Polovragi</u>	137,27	<u>No</u>	Q	05/12/17	
20	<u>Paraul Dracului, Polovragi</u>	78,59	<u>No</u>	Q	05/12/17	
21	<u>Pades, Domogled</u>	493,62	<u>No</u>	Q	05/12/17	
22						
23						
24	<b>Total areas submitted:</b>	<b>2052,62 ha</b>				
25						
26						
27						
28						

### Virgin- / quasi-virgin forest area: COLȚII BALEI

Total area: 306,48 ha.

The forest is State public property, in the administration of the Cislau Silvicultural Forest, of Buzau Forestry Department. It is in a very picturesque area and it stretches up to the alpine gap, part of the Natura 2000 - ROSCI0229 Siriu and it hosts special habitats for the mountain cock, mountain goat and bear.

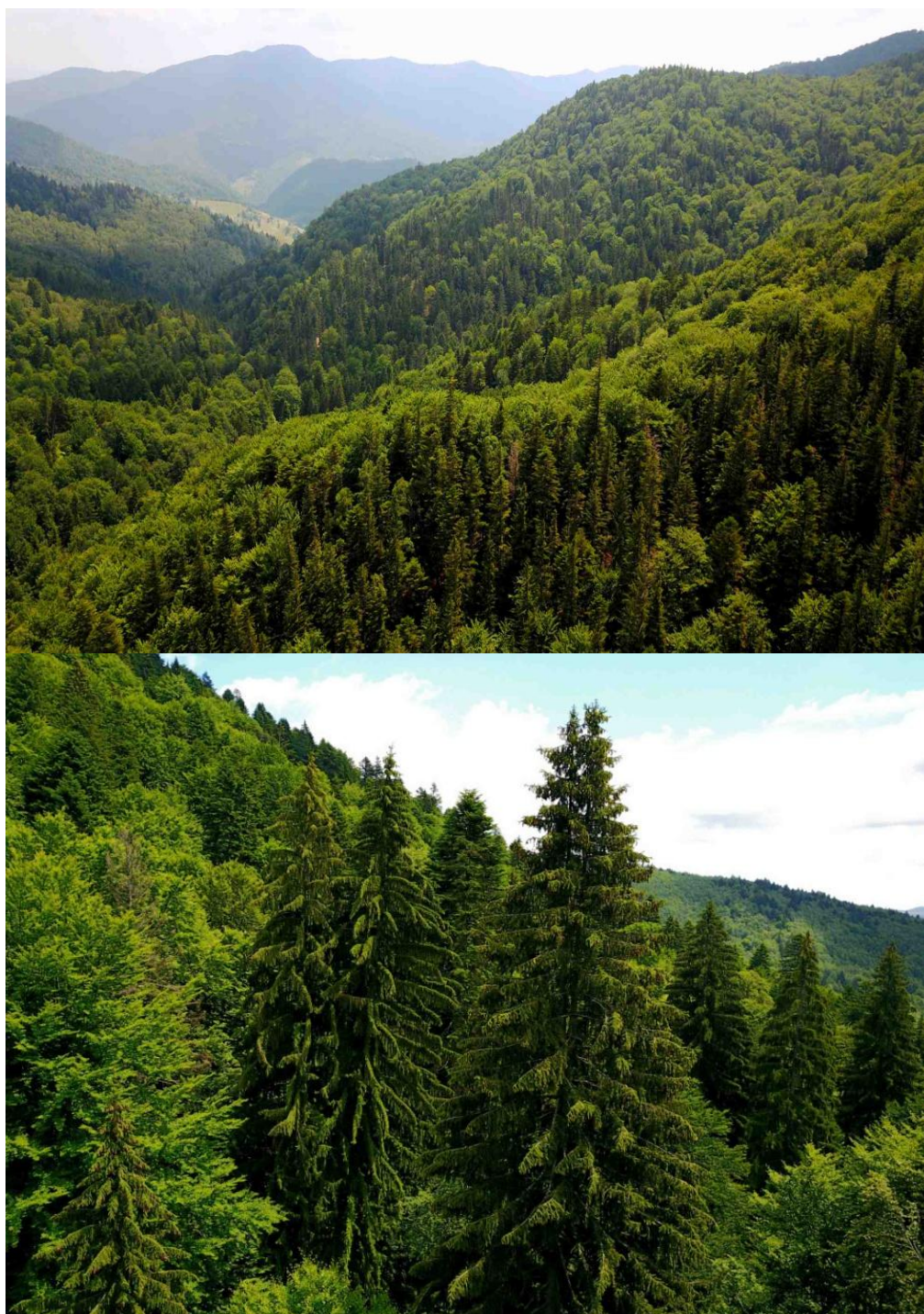


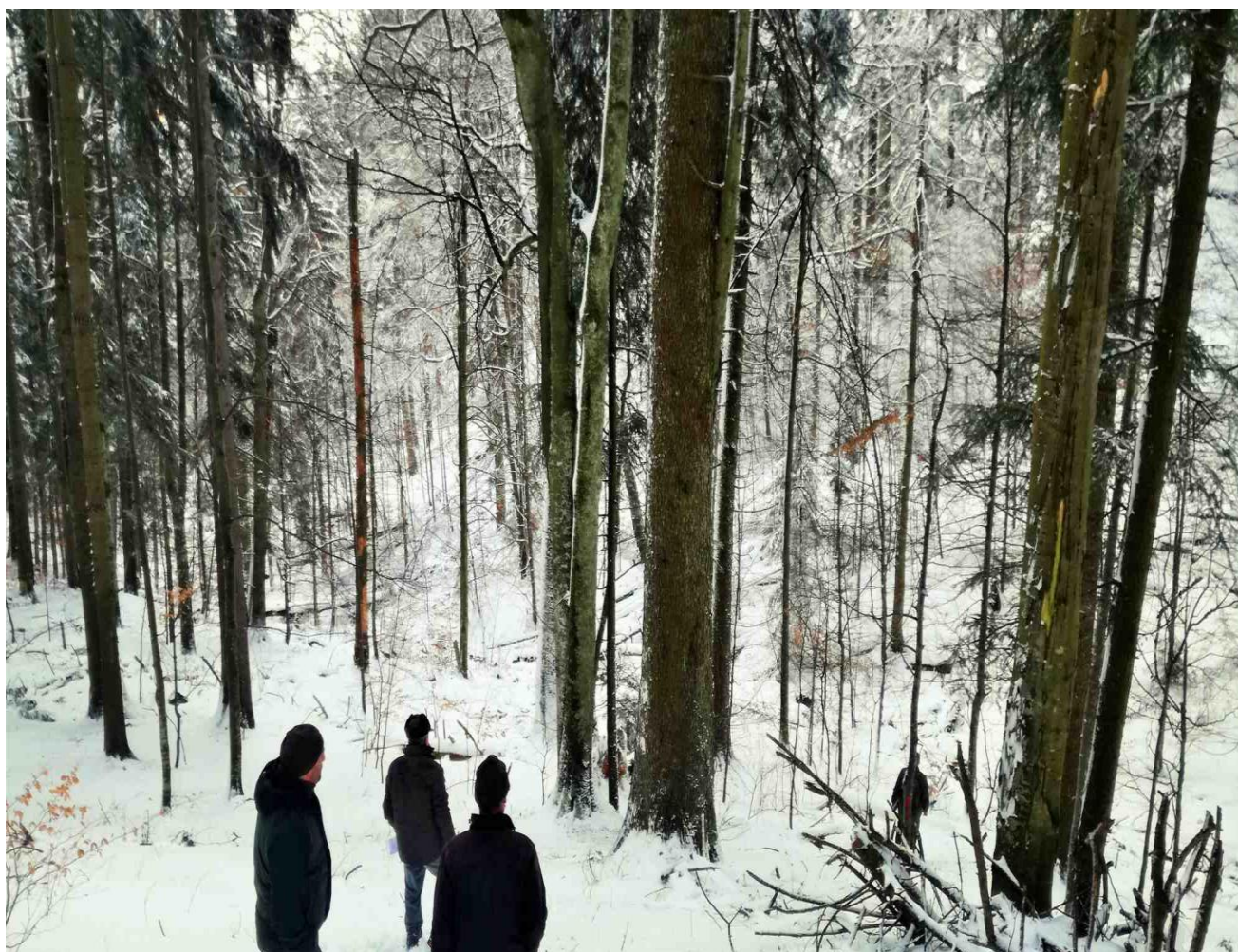
Image 11: Coltii Balei primary forest. © Ion Holban

### **Virgin- / quasi-virgin forest area: COADA BRADULUI**

Total area: 109 ha.

The stands are composed of fir and spruce mixed with beech and mountain maple. There are many tree specimens of great age and size. The forest is privately owned and at present is in the administration of the Teliu Forestry Authority, Covasna Forestry Directorate.





Images 12: Coadă Bradului primary forest. © Ion Holban

### **Virgin- / quasi-virgin forest area: SLĂNICEL**

Total area: 56,48 ha.

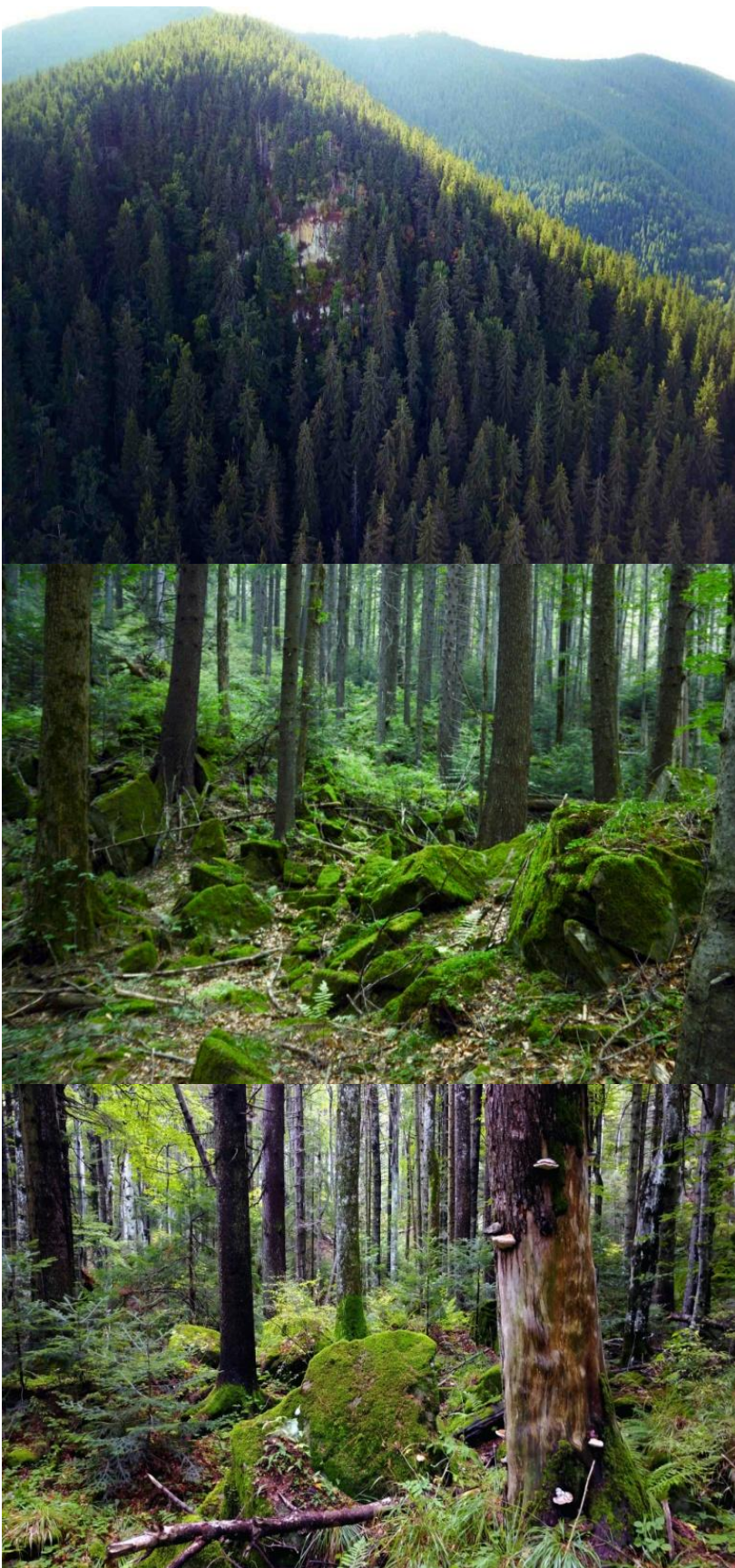
The trees have distinct features, being formed on steep terrain, with a substrate formed entirely on rocks.

Over time, a primary forest has developed with resinous trees as main species (fir and spruce) but also a well represented mixture of beech, mountain maple, mountain elm.

The forest is of a fairy tale appearance because of moss-overgrown rocks and bizarre tree shapes.

Due to the configuration of the land, there are many bear dens, some of them obviously active this year.





Images 13: Slanicel virgin fir - spruce forest. © Ion Holban



### **Virgin- / quasi-virgin forest area: Piatra Cloșani**

Total area: 493.62 ha. A unique mixed forest with Turkish hazelnut trees (*Corylus colurna*). It is located in the protected area ROSCI0069 Domogled-Valea Cernei and ROSCI0129 North West Gorj.

The stands are beech mixed with Turkish hazelnut, hornbeam, ash, mountain maple, lime and other deciduous species. The forest is part of the Natural Reservation Piatra Cloșani (not a strict reserve).

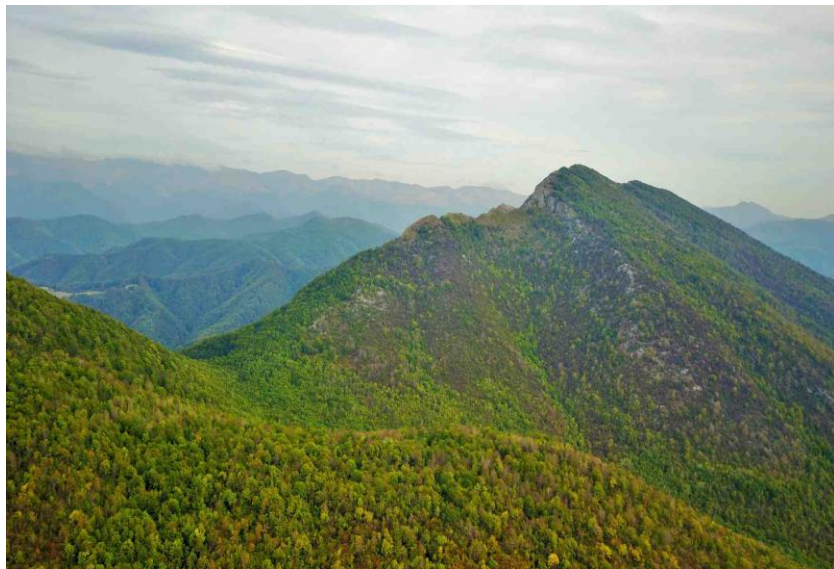


Image 14: Wild landscape of Piatra Cloșani. © Ion Holban

### **Virgin- / quasi-virgin forest area: VALEA CURPĂNULUI**

Total area: 196,3 ha. The forest is private property of Obstea Cainenii Mici.

located on the south-western slope of the Fagaras Mountains at an altitude of 1000-1300m.

The arboretum is a mountainous beech that fits into the community priority habitat 91VO-Dacian beech forests. Due to its unique characteristics this forest was proposed as a virgin forest.

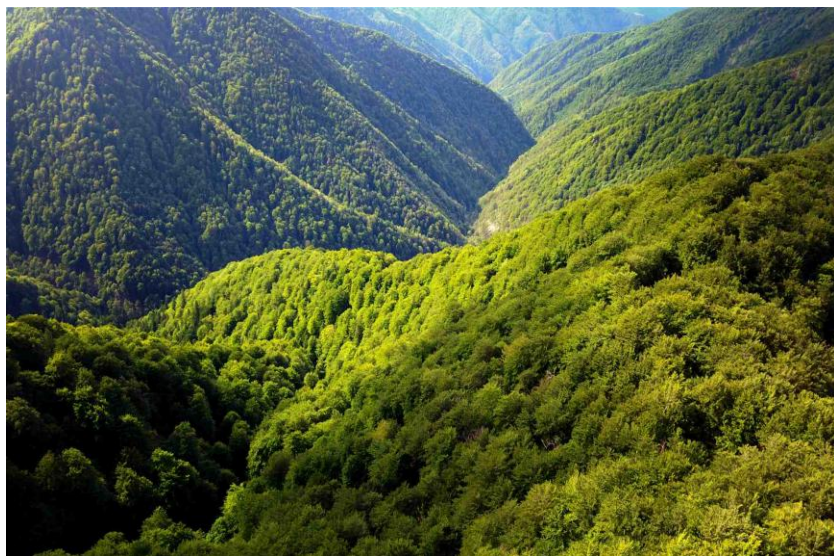


Image 15: Very wild mixed beech forest in Curpanului valley. © Ion Holban





Images 16: Interior of primary forest in Curpanului valley. © Matthias Schickhofer



### **Virgin- / quasi-virgin forest area: Fața bună**

Total area: 53,4 ha. The located on the south-western slope of the Fagaras Mountains, at altitudes of 1000-1500m, slopes higher than 35%, on skeletal soils.

the arboretum is a mixture of beech, fir and spruce, and the upper ones are lime spruce with *Vaccinium myrtillus*, which is a community of interest habitat.



Images 17: Primary mountain forest Fața bună. © Ion Holban

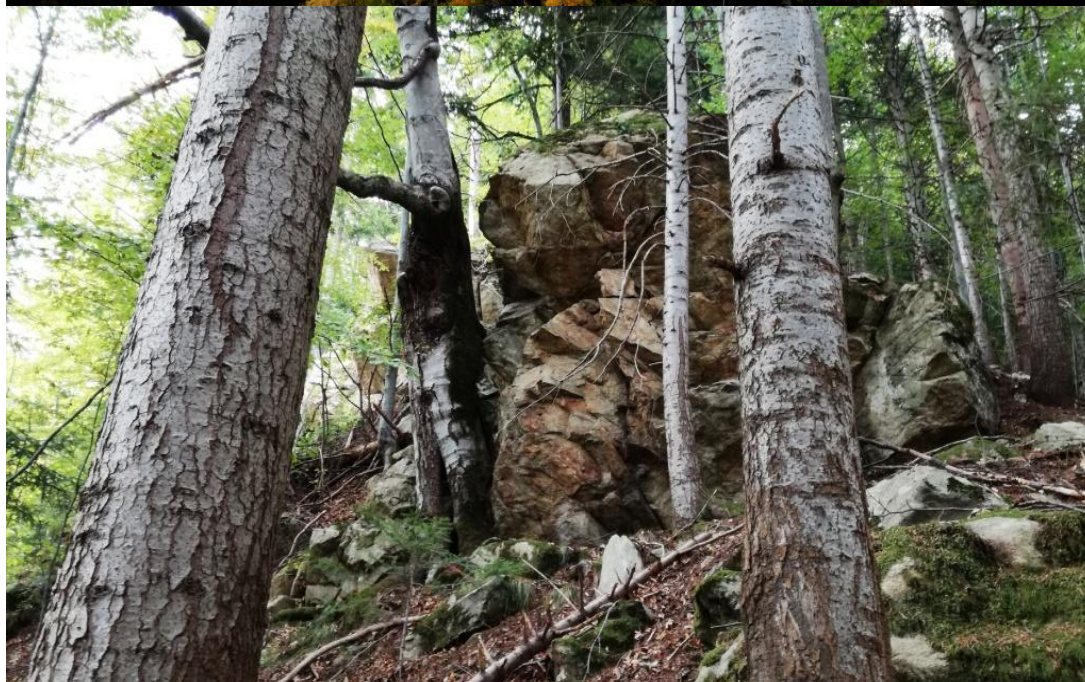
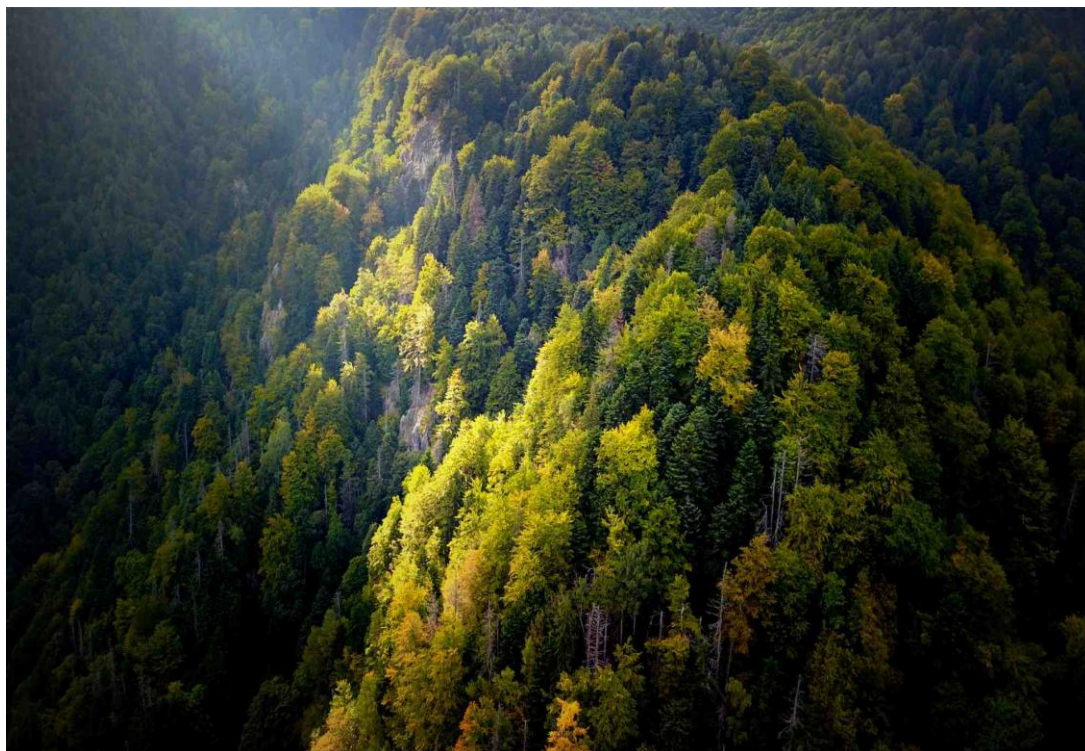
### **Virgin- / quasi-virgin forest area: OLTET, POLOVRAGI**

Total area: 137.27 ha

Stands with fir, beech and spruce mixed on slopes of over 35%.

Forest was not included in the Pin Matra study. State property. UP Oltet. Managed by OS Polovragi, DS Gorj. Part of Natura 2000: ROSCI0128.





Images 18: Forest wilderness of Oltet and Polovragi. © Ion Holban

### **Virgin- / quasi-virgin forest area: PÂRÂUL DRACULUI**

Total area: 78.59 ha.

The stands are alpine spruce and spruce developed on rocks, on very rough terrain at the altitude of 1200-1750m. Located in the Natura 2000 area ROSCI0128 of North East of Gorj. The forest was not included in the Pin Matra inventory in 2005.



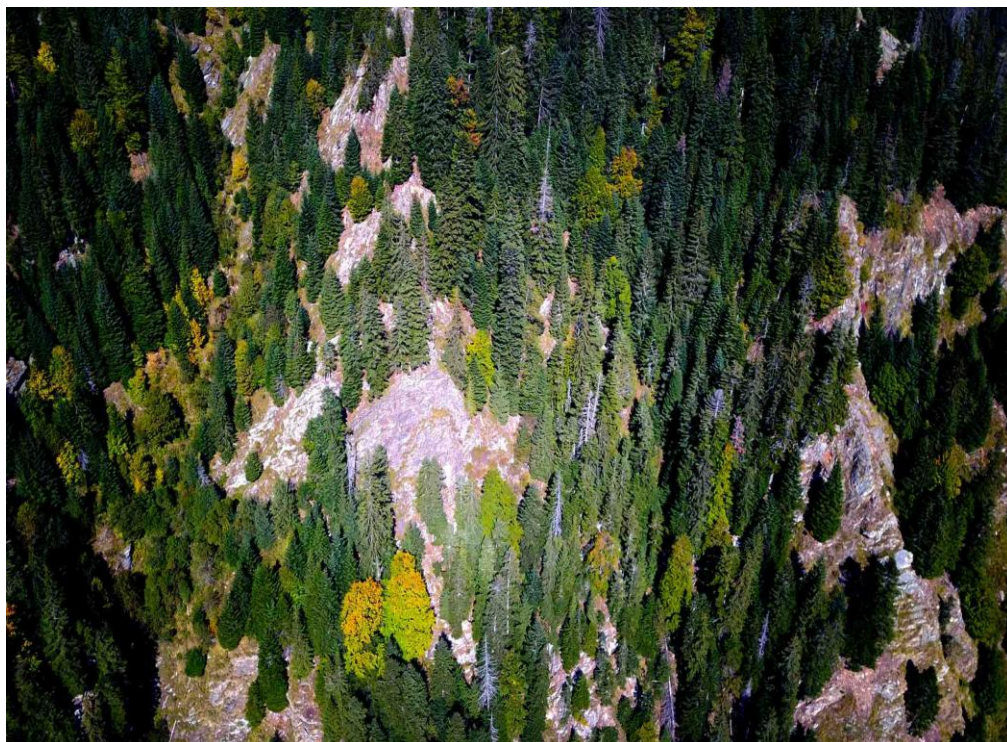


Image 19: Paraul Dracului. © Ion Holban

### **Virgin- / quasi-virgin forest area ASĂU: COLĂCENI – PÂRÂUL ADÂNC FOREST**

Total area: 85.43 ha.

The forest stretches from the Preotesei peak (about 1300 m altitude) to the Asau River, on slopes with steep angles, with an eastern general exhibition. Tree composition is a mixture of beech and resinous trees to the upper third limit of the slopes, from where the forests are composed of mainly spruce.



Image 20: Primary forest in Asau area. © Ion Holban



### **Virgin- / quasi-virgin forest area ASĂU: PĂLTINIȘ**

Total area: 91.59 ha.

The forest is situated on a steep slope with a general angle of over 35 degrees, from which flows the Păltiniș River, a tributary of the Asau river.

Tree composition is a mixture of resinous forests. Clear virgin forest features such as impressive trees (of over 300 years of age) and sizes (diameters greater than 100 cm and heights above 45 m).



Image 21: Wild mountain forest Paltinis. © Ion Holban

### **Virgin- / quasi-virgin forest area ASĂU: MERIȘOR**

Total area: 34.15 ha.

In the previous management plans the forest was classified as a seeds reserve, which is the main reason why it has not been logged up to present times.

It is located close to the source of the Asau River, and consists of a distinct area with mostly beech, and another area with mostly spruce, and some mixed areas in between.



Image 22: Methuselah beech trees in Merisor primary forest. © Ion Holban



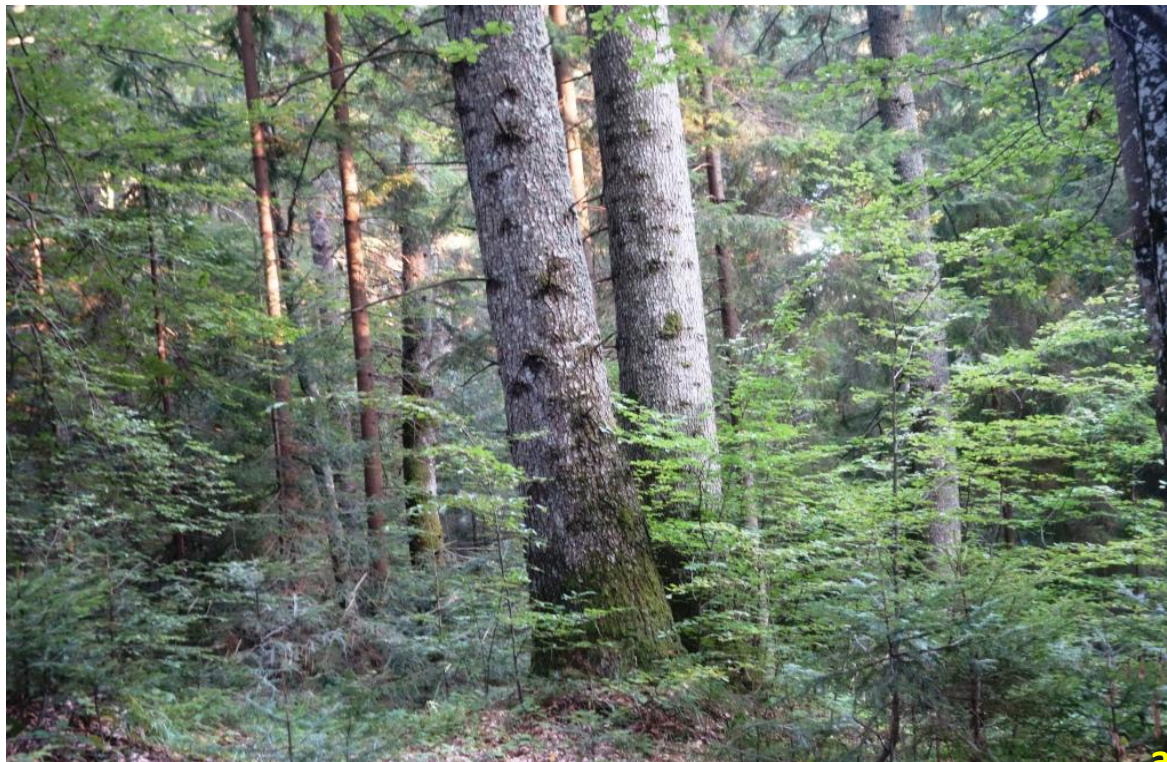
### **Virgin- / quasi-virgin forest area ASĂU: LESPEZI**

Total area: 153.27 ha.

It is currently classified as a seeds reserve for resinous species.

Throughout this forest there are trees of outstanding ages and dimensions.

The forest is located in Tarcăului Mountains, in the basin of the Asau River and it is state owned.



Images 23: Lespezi primary forest. © Ion Holban



### **Virgin- / quasi-virgin forest area: SĂRĂRIE**

Total area: 108.98 ha.

The forest is a mixture of spruce and fir on slopes larger than 35%. It was not included in Pin Matra and is part of the Creasta Nemirii Natural Reserve.

It contains many trees with diameters over one meter and ages over 150 years.



Image 24: Sararie primary forest. © Ion Holban

### **Virgin- / quasi-virgin forest area: ȚIGANCA**

Total area: 53,84 ha.

The forest it is a mixture of spruce and fir on slopes steeper than 35%. It was not included in the Pin Matra study and is located in the Nemira Mountains.

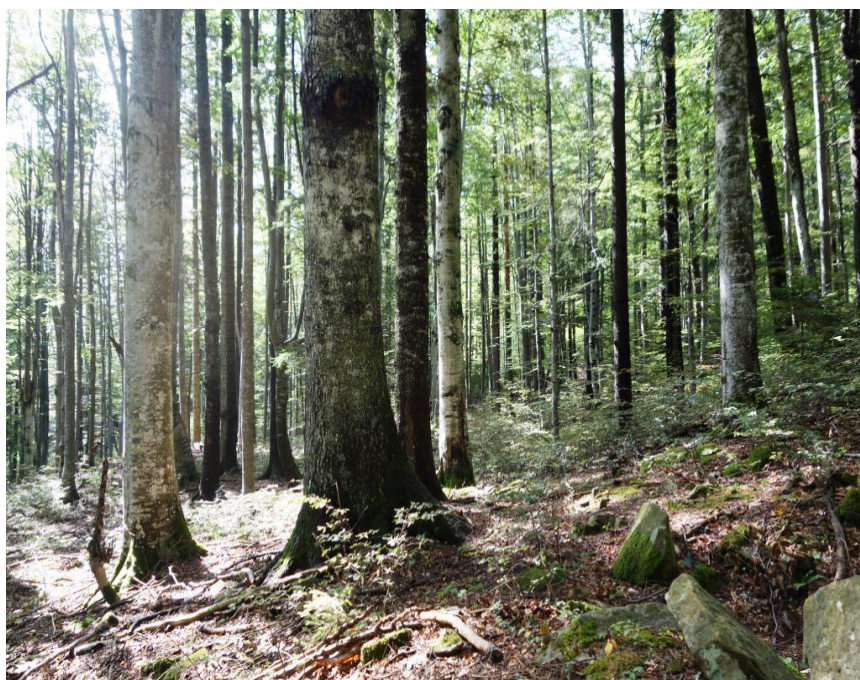


Image 25: Tiganca forest. © Ion Holban

### 3.2.2.2. Forests mapped in 2018

#### Overview about mapped and submitted forest areas:

- Boia Mică – 974,60 ha
- Budislavu – Sterminoasa - 167,50 ha
- Visa – Vulturu – 177,91 ha
- Paraul Ursului - 33,38 ha
- Coadă Lacului - 60 ha Dobre – 152,29 ha
- Pusta - 155,37 ha Crasna - 380,59 ha Muncelu - 143,38 ha
- Preluca Jneapan - 126,92 ha Oituz – Calaslau – 64,70 ha

#### Detailed descriptions:

##### **Virgin- / quasi-virgin forest complex: Boia Mică and Budislavu – Sterminoasa**

Total area: 1,142.10 ha

These two forests form a continuous body of 1,142 ha - the largest area mapped by the project so far and, most likely, the largest privately owned virgin forest in Romania (25 ha – state owned, 1.117 ha – privately owned).

##### ***The Outstanding natural heritage of Boia Mică (974,60 ha)***

Boia Mică is located in the European Natura 2000 site, Făgăraș Mountains. Europe's Natura 2000 legislation aims to protect valuable habitats and rare species, but this valley is (December 2019) not protected formerly from logging.

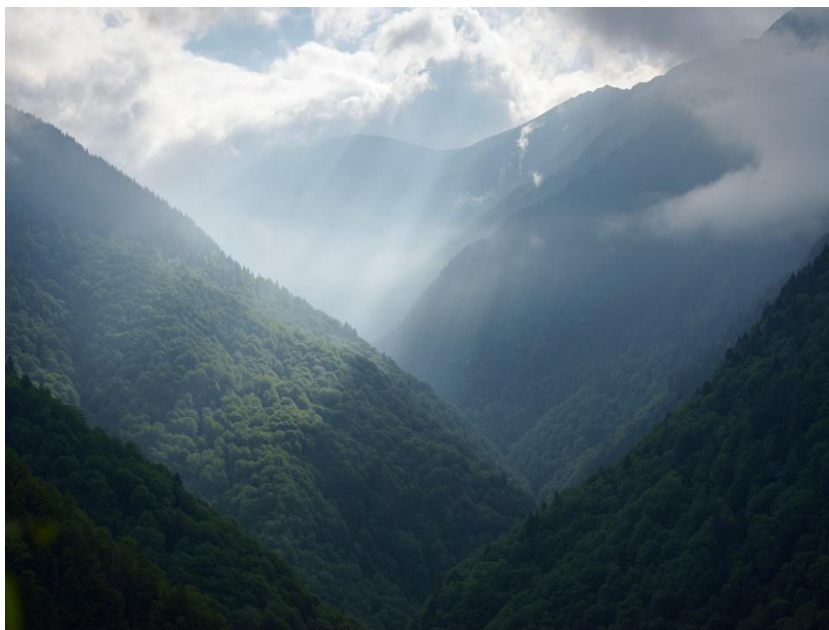


Image 26: Untouched, remote, pathless upper Boia Mică valley. © Matthias Schickhofer

Boia Mică is a significant hot spot of biodiversity and of great beauty. The upper part of Boia Mică is an untouched valley without any road or even without any trail.

Because of the extreme orography (steep and rocky slopes) and the remote location (more than 15 km from the next village) the forests have never been systematically cut and remain more or less untouched (maybe except some local charcoal production in the more accessible parts).

There are no traces of any human impacts in upper Boia Mică. Maybe Boia Mică is the only entire catchment in the Romanian Carpathians in a completely pristine status.

The upper Boia Mica catchment represents a typical vegetation complex of the Southern Carpathians on acid rocks from the middle mountain to the alpine belt. It reflects the altitudinal gradient, different expositions as well as diverse geomorphological forms. The forest shows all stages of the natural regeneration cycle of mountain beech and mixed forests, and it documents changes of forest line in relation to climate change.

The wild forests are a biotope of bear (*Ursus arctos*), deer (*Cervus elaphus*), wolf (*Canis lupus*), lynx (*Lynx lynx*) and of chamois (*Rupicapra rupicapra*). The spotted salamander (*Salamandra salamandra*) is a typical amphibian and the black woodpecker (*Dryocopus martius*) a characteristic bird of Carpathian beech forests. And above the tree canopy the golden eagle (*Aquila chrysaetos*) floats in the air.

The old forest is also habitat of rare saprophytic beetles, such as *Rosalia longicorn* (*Rosalia alpina*) and to the almost extinct Hermit beetle (*Osmoderma eremita*).

The project team collaborated closely with Dr. Martin Mikoláš (Slovakian forest scientist working at the Department of Forest Ecology at University of Life Sciences in Prague), who has been conducting scientific research in a large range of primary forests in several European countries for many years. The project, which is led by Czech Professor Miroslav Svoboda, is called REMOTE - REsearch on MOUNTAIN TEMperate Primary Forests. Dr. Mikoláš and his colleagues have been developing a long-term international research collaboration based on a network of permanent sample plots in selected primeval forests of central, eastern, and southeastern Europe.

REMOTE has been doing intensive research in Boia Mică. Their findings confirm that this valley is of very high scientific value. The scientists have climbed very steep slopes to get to their random permanent study plots. They measured tree dimensions and ages and monitored changes of the forest structures and dynamics over a long period of time. They detected probably the oldest beech tree of Romania there: over 500 years. All together, they found 15 trees older than 400 years on 14 inventory plots in Boia Mică. The plots have been selected randomly. They state, that they certainly would have found more methuselah trees there, if they would have searched for them systematically. „This valley hosts the oldest forest we have found in all our primeval forest research so far”, Dr Mikoláš said.

The project team initially started with an area of about 800 ha, but by the end of the research the study area was increased to 974 ha.

The team detected strong discrepancies between the data management plans and the findings in the forest, in particular in terms of average ages. The management plan defines some parcels with ages of only around 100-120 years old. Following our research, average ages are at least about 150 years.

The team is grateful that they were also able to use Martin Mikolas' / REMOTE research results (University of Prague).

They have kindly provided the project with data from 25 research plots within Boia Mică, including 225 trees that were individually sampled and the average age of his plots was 191 years old.

The team also looked at historical records of human intervention in the area and have determined that there has been no forest roads in the Boia mica valley until 1993, when only a small amount of wood was logged along a few hundred meters. Also satellite images from the 1960-ties (declassified images from US CORONA programme) were used to testify the „virgin“ status of Boia Mică.

So the team could proof that vast majority of Boia Mică valley is truly untouched and was never managed in a systematic way. Thus they proposed to include 736 ha as virgin forest and 238 ha as cvasi-virgin forests to the „National Catalogue“. Basically a few parcels on the subalpine edges of the forest (238 ha), that had signs of mild antropogenic influences from shepherds, were put down as cvasivirgin and the core area as virgin (736 ha) forests.





Image 76: Boia Mică seen from a rock at the lower entrance. © Matthias Schickhofer



Image 28: Stand with very old beech trees (> 400 years) in upper part of Boia Mică. © Matthias Schickhofer

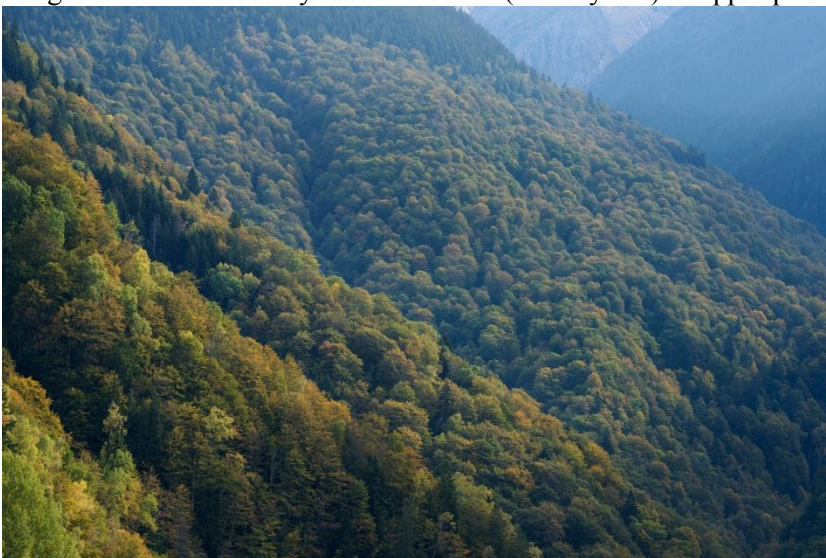


Image 29: View towards stands with beech trees older than 400 years. © Matthias Schickhofer



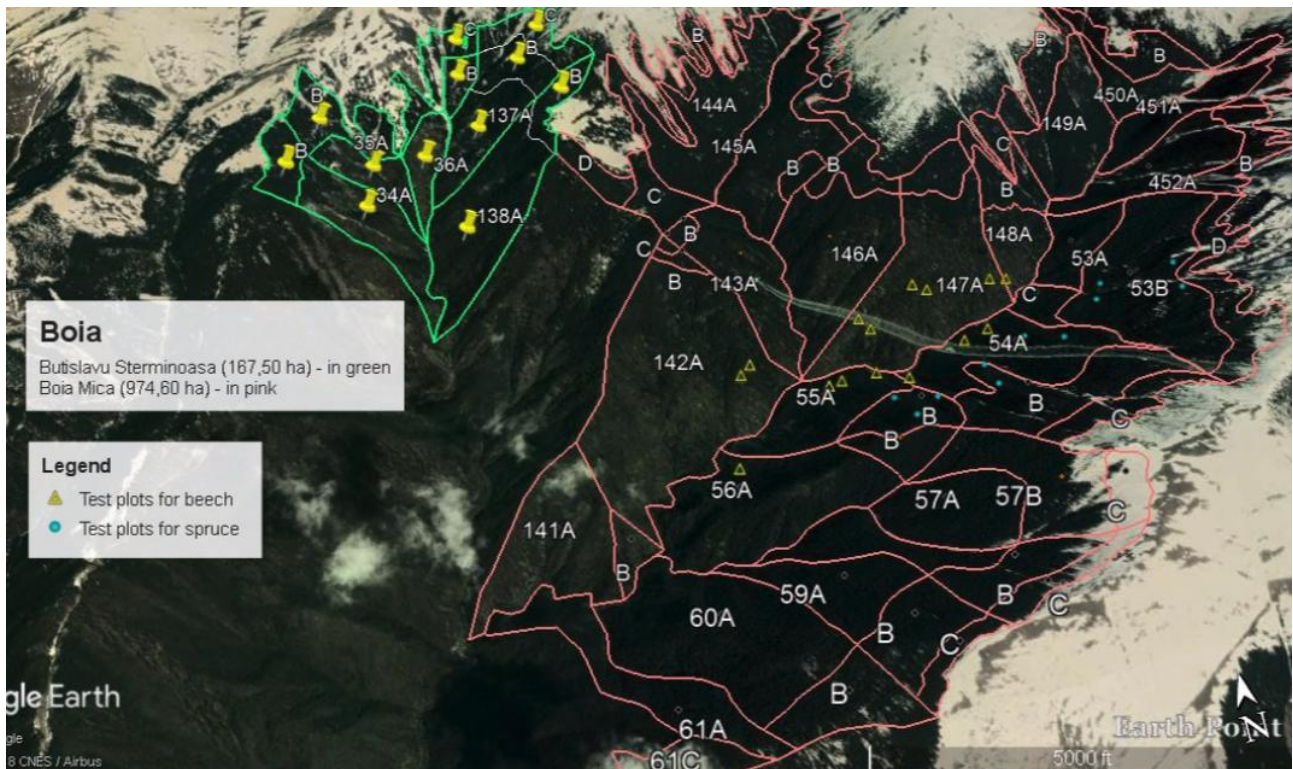


Fig. 11: Overview about Boia Mică valley and forest parcels. (Image source: Google Earth, CNES / Airbus)

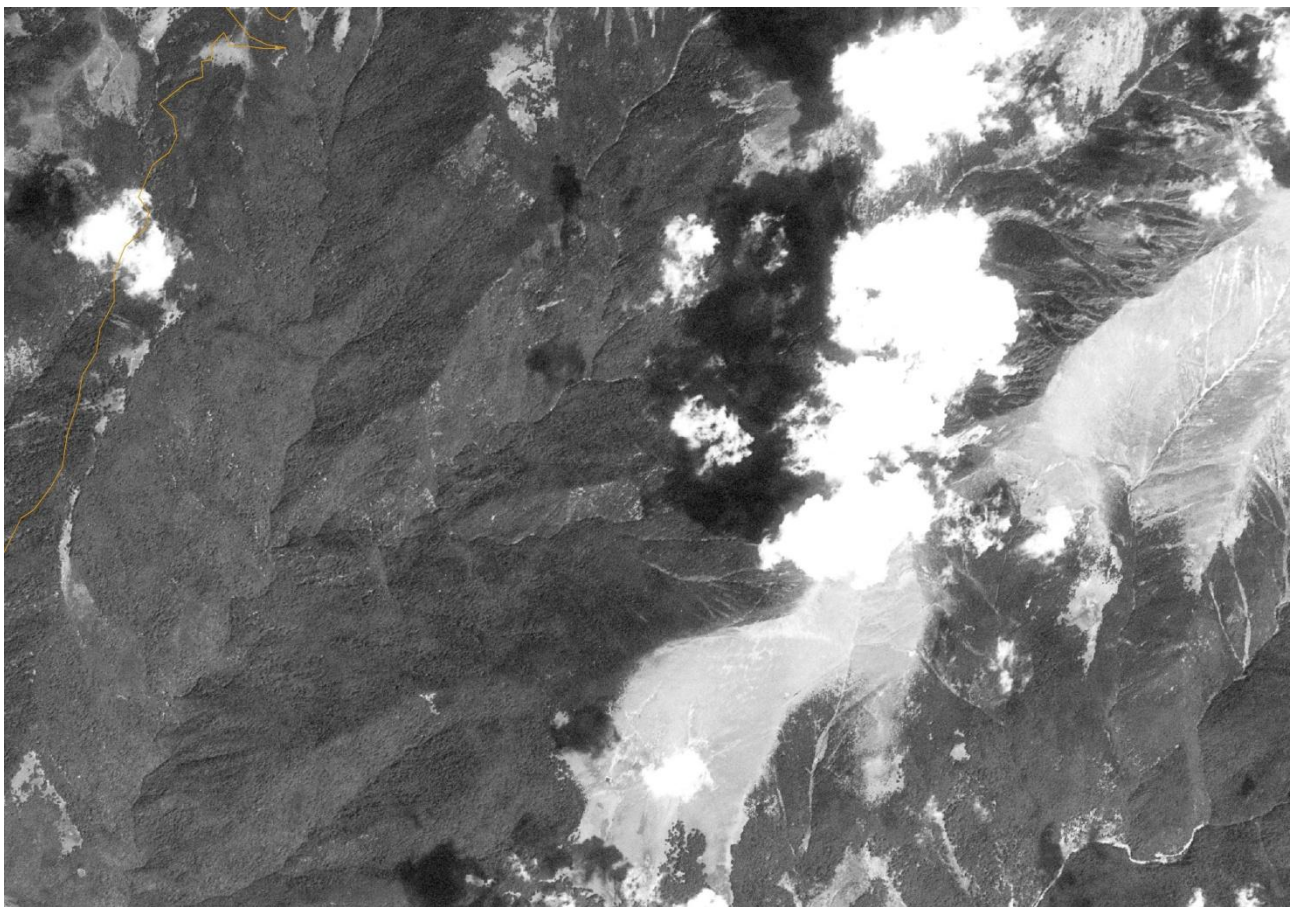


Image 30: Satellite image of Boia Mică valley in 1969 shows roadless wilderness, without any signs of human activities. Nevertheless, a Forest Guard argues that these forests were partly logged some decades ago and thus are not „virgin“. © USGS (CORONA)



### **Virgin- / quasi-virgin forest area: Budislavu Sterminoasa – 167,50 ha**

Initially an area of 200 ha was researched but due to various interventions the area mapped had to be reduced to 167,50 ha (owned by three different private owners). The forest holds similar tree stands as the neighboring Boia Mica valley, with beech, fir and sycamore at the bottom and spruce at the top. Average ages are over 160 years.



Images 31: Areal views of Sterminoasa valley. © Ion Holban

### **Teregova (Tarcu) region**

Five forests have been mapped in this area totaling 578,95 ha.

None of these forests was included in the Pin Matra inventory, which indicates that several large areas of virgin/quasi-virgin forests are missing from the original Pin Matra study.

### **Virgin- / quasi-virgin forest: Visa – Vultur**

Total area: 177,91 ha.

The forest has been approved for the Catalogue already.

In this stand we have looked initially at an area of 156 ha but after further research we have expanded our stand to 177 ha. This is an isolated forest stand, with no roads, reaching altitudes of over 1450 m. Beech is the predominant species and it reaches impressive dimensions towards the top, frequently over 175 years.





Images 32: *Ursus arctos* and *Natrix natrix* at Visa Vulturii © Ion Holban

### **Virgin- / quasi-virgin forests: Paraul Ursului and Coda Lacului**

Paraul Ursului: 33,38 ha

Coda Lacului: 60 ha

The forests have been approved for the Catalogue.

These two forests are close to each other forest, along the same valley, sheltered by steep slopes from the bottom and all the way to the top. These very steep slopes, of over 40 degrees are predominantly beech, mixed with fir. It is a habitat favoured by brown bears, mountain goats, lynx and holds an animal observatory, where hunting is no longer permitted.



Image 33: View from Coda Lacului towards Paraul Ursului in Hideg valley. © Ion Holban



## **Virgin- / quasi-virgin forests: Dobre and Pusta**

Area acreage: 152.29 ha and 155.37 ha

The forests are still awaiting approval. These two forests are in the same basin, situated towards the limit forest vegetation, below the alpine meadows. Initially, we have proposed it as a single forest stand of 330 ha, but, after the commission with the Forest Guard in November 2018, we had to split it into two stands with a smaller joint area of 307 ha. These forests are majority beech stands, of impressive dimensions and ages. In the lower and upper area other trees appear in the composition of the stands, especially fir, disseminated with maple and mountain elm.

In the pending management plan, the stands are described with a pluriene structure, formed of four generations - 225 years, 185 years, 145 years and 80 years.

Some stands are actually mentioned in the Management plan with an average age of 225 years, which is the highest average age we have seen so far, in these official documents.

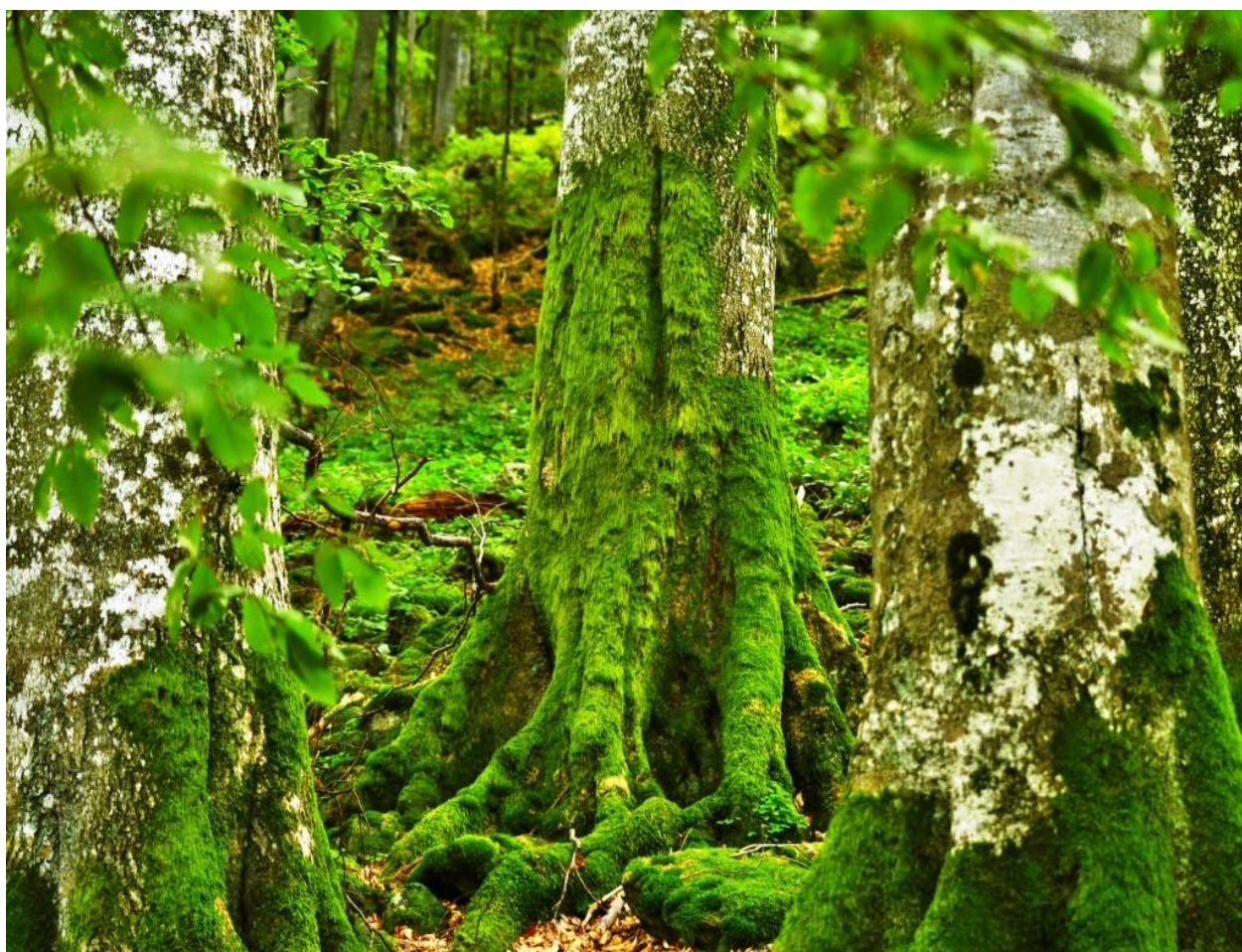


Image 34: Wild interior of Dobre primary forest. © Ion Holban



**Maramures region:** 650,89 ha mapped in total.

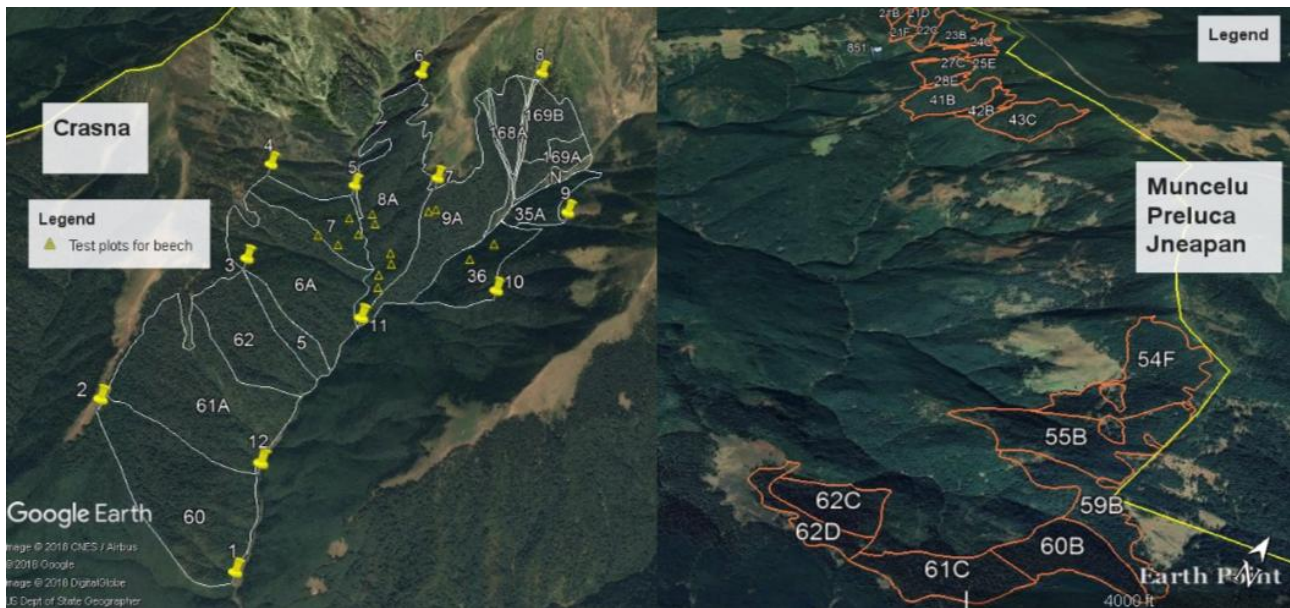


Fig. 12: Overview Maramures area. Image source: Google Earth, Digital Globe.

### **Virgin- / quasi-virgin forest area: Crasna**

Total area: 380,59 ha.

Large trees, mostly beech and fir dominate this forest, where elements of different ages and diameters are abundant, highlighting its plurality character. An interesting feature encountered in this forest is the high frequency of the presence of Salamander (*Salamandra Salamandra*). This is an important indicator for well-preserved forest forests and well-preserved forest habitats. The team of REMOTE project (Martin Mikolas et al) from Prague University has been doing research here as well.



Image 35: Crasna forest. © Ion Holban

### **Virgin- / quasi-virgin forest area: Muncelu (143,38 ha) and Preluca Jneapan (126,92 ha)**

These two forests are close to the border with Ukraine and are currently protected as nature reserves but, as this status can be changed, the higher protection offered by the National Catalogue was welcomed here.

Maramures unfortunately remains a conflict region for logging in Romania. Many spruce trees have big dimensions (diameters > 1m) and impressive ages (over 150 years). Large trees therefore dominate the vegetation, but with complex structures such as young spruce seeds regenerated on dead wood, evidence of its plural character. At the upper limit of the forest there are juniper trees surrounded by carpets of moss and blue berries plants with abundant fructification.



Image 36: Muncelu forest area. © Ion Holban

### **Virgin- / quasi-virgin forest area: Oituz – Calaslau**

Total area: 64,70 ha

The forest is growing on rather steep slopes but it is still accessible as it is located close to the main European road (linking Bacau and Covasna). Predominantly beech with fir and sycamore, with ages on average of over 160 years. The stands have complex structures, like a mosaic in the horizontal plane and layered vertically. All stages of development are present, including an array of dead trees in different stages of decomposition.



Image 37: Oituz - Calaslau primary (beech) forest. © Ion Holban



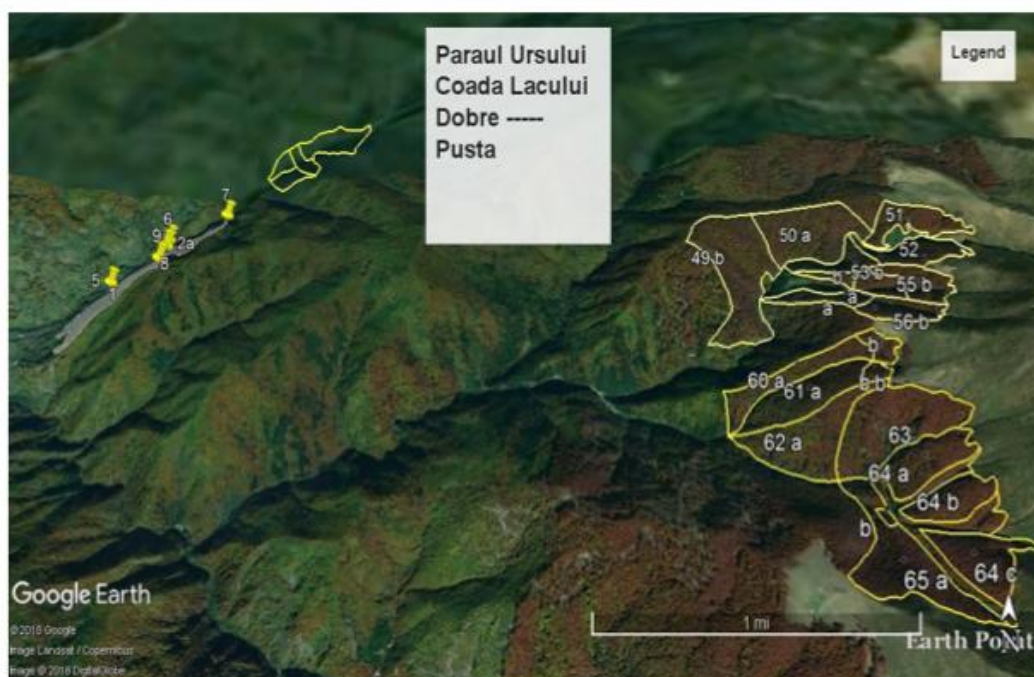


Fig. 13: Overview Teregova area. Image source: Google Earth / Copernicus, Landsat

## 4. Conclusions

### 4.1. Expert workshops: *Exchange about results and experiences*

At three expert workshops in Romania the project team members and external scientific collaborators exchanged experiences and discussed proposals for improvements:

- April 18 / 19, 2017 (Transilvania University Brasov)
- January 13 / 14, 2018 (Transilvania University Brasov)
- April 12 / 13 / 14, 2019 (Lucian Blaga University Sibiu)

The workshops were generously hosted by the Department of Forestry at Transilvania University Brasov (Prof. Dr. Lucian Curtu) and the Faculty for Agricultural Sciences, Food Industry and Environmental Protection at University „Lucian Blaga” Sibiu (Prof. PhD. Camelia Sava and Assoc. Prof. PhD. Maria Mihaela Antofie).

#### ***Key findings of the final expert workshop in Sibiu (April 12-14, 2019):***

##### **Approval process for the „Catalogue of Virgin Forest“:**

Discussion about the tiring approval process with the Technical Commission in Ministry for Water and Forests (CTAS): Commission members are foresters and there is lack of biological and ecological expertise. A better mix of disciplines would help to improve quality of work.

Some individuals at the commission showed a negative attitude towards protection of old growth / primary forests as such and did not show much respect for expert studies.

Statements by participants:

Some members of CTAS „only stick to strict criteria for virgin and quasi-virgin forests and to forest management plans. Even if there are obviously mistakes.“

„We had to deal with several different forest guards.“ „Each of them had a different approach.“ „Some of them had not much idea about the ‚Catalogue‘ and virgin forests and had no interest in nature conservation at all.“

„Some other forest guards are open minded and were cooperative.“

„We ended up in a ‚communication war‘. CTAS forced us to communicate only via post snail mail.“ „Some members of CTAS used every little detail in the foundation studies to block or delay progress.“

„Members of mapping teams found it sometimes difficult to establish contacts with foresters.“

Forest administrators do often „not recognize mistakes in management plans“ (e.g. misleading forest age data).

„A major obstacle for protection is that town halls cannot get compensation.“

„Some private owners pressurized us to remove forests.“

„In ministerial order there is no mention of a ministerial councilor being a member of CTAS. Many of the blockages came from the Ministry. Commission members even did not agree with the councillor of ministry.“

„Sometimes we were facing problems with private owners, because they do not trust ‚Bucharest‘“.

### **Discussion about comprehensive or fragmented mapping approach:**

There was also a debate about virgin forest mapping efforts in general. Participants expressed critique that sometimes virgin forest areas were mainly identified by using data from forest management plans but not by verifying the real situation in the field. This resulted in some isolated fragments of protected forests, large areas in between, although they were identical with the mapped parcels, were left out and thus will very likely be logged.

Afterwards, the participants had a critical discussion about the in-comprehensive way forest areas were identified and submitted to the „Catalogue“ by other instances in some regions. In some cases only a few forest parcels in a larger natural forest area or in a wild valley were submitted, the rest of the equally qualified old growth forest was not included - and thus the high conservation value forest was de facto left for logging.

### **Discussion about the Romanian criteria for virgin forest identification:**

Many of the participants agreed that the latest ministerial order regarding virgin forest protection (2525/2016) has fundamental flaws („very bureaucratic setup“).

Several statements criticized that the criteria for identification of virgin and quasi-virgin forests are not sufficiently based upon scientific research.

Researchers (REMOTE project) explained that the criteria are mainly referring to one stage of forest development: the „climax phase“. This phase is characterized by large numbers of large and / or old trees, and a strong presence of dead wood.

To reduce a description of primary forests to climax development phase only reflects an unscientific approach to primary and old growth forests. In reality, virgin and quasi-virgin do show all stages of forest development, depending on their disturbance history in the past. If an unmanaged, old growth forest stand was effected by a larger disturbance more than 100 years ago, the forest might appear today as even aged stand without complex structures and with only low amounts of dead wood. Furthermore, virgin forests in extreme expositions also might not show large trees or high levels of dead wood, e.g. on very dry stands or at higher altitude.

The criteria as defined by the ministerial order contribute to exclusion of such forest stands from protection. It was reported by a representative of REMOTE forest research project, that in Slovakia different criteria are being applied which do refer to all stages of forest development and different ages.

### **Threats for high science value forests (e.g. in Fagaras):**



REMOTE research project also reported that some of their permanent study plots in primary forests in Fagaras mountains are not protected and face acute logging threats. This would destroy several years of research (dendrochronological data, monitoring of disturbance dynamics).

They commissioned a Romanian company to conduct mapping and submit these forests for inclusion in the „National Catalogue of Virgin Forests“. However, this agency reported that none of the research forests of REMOTE can be included as „virgin forests“, because they fail to meet the criteria for the „Catalogue“: Data in forest management plans would prove that the forests have been managed in the past or they are „too young“. REMOTE project is the biggest primary forest research project in Europe and team members are among the most experienced experts in this regard. They can confirm the pristine status of their research plots.

The fact, that a Romanian agency argues with questionable forest management plan data, that these high science value forests are not „virgin“ (and thus cannot be protected) caused a strong discomfort within the wider scientific community.

### **Concerns about disrespect for environmental protection regimes:**

Another discussion point was the severe shortcomings regarding implementation of the EU's nature directives. Several statements showed that primary and old growth forests in Natura 2000 sites are systematically being deteriorated by logging without any proper appropriate assessments.

Experts reported that environmental approvals were often just bureaucratic exercises. They are being issued without thorough mapping of conservation value habitats / species. So, Romanian authorities rather likely do not comply with the legal obligations set by the Habitat and Birds directives.

It was mentioned that the ruling of the Court of Justice of the European Union (CJEU) on the Bialowieza case (April 2018) about logging in a large Natura 2000 site in Poland determines a strict interpretation of both Habitat and Birds directives. The CJEU decided that logging of old stands with dead wood, a high likelihood of presence of protected species and without sufficient appropriate assessments is not compatible with the Natura 2000 legal framework. NGO's (EuroNatur, Client Earth) are preparing complaints to the EU Commission about systemic breaches of EU law by logging in Romania's Natura 200 sites.

### **Not only classified „virgin“ forests are worth to be protected**

EU's Nature Directives and national nature protection laws do not restrict protection of natural forests to „virgin“ stands. Thus it is needed to widen the scope. To only not stick to the narrow identification criteria for the „Virgin Forest Catalogue“ leaves large forest areas of very high conservation value without protection. This leads to deterioration of huge forest areas which should be protected under the EU's Natura 2000 regime.

The participants agreed that there is a need to protect larger complexes of natural forest landscapes rather than create little fragments of virgin forest „museums“.



Image 38: Final project workshop (Senate Hall, University „Lucian Blaga“, Sibiu). © Matthias Schickhofer



Image 39: Project excursion to unprotected primary forest in Arpasul valley (Fagaras mountains) in conjunction with the final workshop (with partners of REMOTE project). © Matthias Schickhofer



## ***4.2. Excerpts from discussions with Romanian project partners***

### **Interactions with public forest owners**

Overall, most of the interactions with local state administrators have been good. Once the notification was sent and contact made the experts were given assistance in the field and access to management plans.

Sometimes they were even given free accommodation and guides.

There is an ongoing issue with townhall forest owners that do not get compensation and have no interest in mapping / protection.

### **Interactions with private owners**

There were mixed interactions with private owners. Some owners were initially more reluctant to work with the project partners, but eventually they have cooperated with them. Others (such as the ones from Bucova) did not give access to their forest at all. Similarly, big foreign owners such as Tornator (Finland) and Lignum (Germany) did not even replied to requests to conduct mapping of some of their high biodiversity value forests. Others, such as Greengold have politely declined mapping saying that they want to use another partners for mapping. Midguard (Sweden) have rejected and even disputed previous studies (going back to 2016).

### **Interactions with Forestry Guard**

These interactions vary greatly according to the person in charge. There were positive interactions with Caras Severin, Timisoara and Maramures Forest guards.

But there were difficult experiences with Valcea Forest guard who refused to give a clear note of approval to some of the studies and this resulted in long delays at the Ministry (commission). He rejected studies, just stating that „this is not a virgin forest“ (based on personal opinion) and denied to consider scientific research data attached to the foundation study (REMOTE project, University Prague). There was also refusal to conduct a field visit to validate naturalness of disputed sites on the ground.

Similarly, Brasov Forest guard were, at times, over-buerocratic, with small forests such as Coadă Bradului requiring several repeated field visits.

### **Interactions with the Ministry of Waters and Forests**

So far it has been extremely difficult. Many studies have been blocked at the Ministry due to over-zealous staff responsible for the National Catalogue of Virgin Forests. Regarding this on-going issue, we wrote official letters to the Ministry in which we expressed our point of view concerning the various buerocratic reasons to delay studies.

Our replies were also communicated to the CTAS members in the latest meeting and it appears with good results as the forests discussed (such as the ones from Teregova) were approved in autumn 2019.

We hope to improve the dialog with both Ministerial staff and CTAS members in the future to speed up the approval process.

### **Other issues encountered**

Government compensation is not permitted for town halls or it is not cleared - the law says it is only for private owners – Oituz Calaslau forest has been blocked by the town hall initially, then later they said they will approve it only after compensation has been agreed.

Some NGOs are making our interaction with forest owners difficult because of ongoing legal procedures - such as Boia Mica, where the owners are not currently communicating with us because they have been taken to court for access to Management plans

## 5. Public communication about the project

### Media coverage with mention of the project / project work:

- Universum Magazin (science monthly, Austria; April 2018); „System Dracula“ (not available online).
- ORF / Ö1 (national radio / Austria): Radio feature about „Easter Europe“ („Der arme Osten der EU“; interview with Matthias Schickhofer). <http://oe1.orf.at/programm/20171130/496745> (aired 30.11.2017)
- ORF / Ö1: Auf der Suche nach der Wildnis. <https://oe1.orf.at/programm/20180812/523324/Auf-der-Suche-nach-Wildnis> (aired 12.8.2018)
- Der Standard (daily newspaper, Austria): Kampf um Rumäniens Urwälder. <https://derstandard.at/2000069740402/Kampf-um-Rumaeniens-Urwaelder>
- HFR Website: <https://www.hs-rottenburg.net/aktuelles/aktuelle-meldungen/detail/artikel/wettlauf-um-rumaeniens-urwald/>
- Saveparadiseforests (info website / EuroNatur): <http://www.saveparadiseforests.eu/de/deutsche-bundesstiftung-umwelt-unterstuetzt-rumaenische-forscher-bei-urwaldkartierung/>
- Die Zeit (weekly magazine, Germany): Eine Welt wie vor tausend Jahren. <https://www.zeit.de/2018/47/karpaten-rumaenien-urwaelder-bedrohung>
- Bayerischer Rundfunk / BR (Germany): Europas größte Urwälder in Gefahr. <https://www.br.de/mediathek/podcast/radiofeature/kampf-um-rumaeniens-urwaelder-warum-europas-letzte-wildnis-in-gefahr-ist/1788168>
- Background feature by Addendum (Austria): Abgeholzt. <https://www.addendum.org/holzmafia/wald-rumaenien/> (with mention of project conference in Sibiu, April 2019).

### Presentations at conferences and other public events with mention of the project:

Fagaras Mountains Conference, December 10 - 11, 2018, Bucharest. Presentation by Matthias Schickhofer <https://www.carpathia.org/international-conference-fagaras-mountains-scientific-arguments-for-creating-a-new-national-park/>.

Book of abstracts: [http://www.ibiol.ro/ibb/Book\\_of\\_abstracts.pdf](http://www.ibiol.ro/ibb/Book_of_abstracts.pdf)

Congress “Temperate and boreal forests in the face of global change Conference, 2-4 September, Lviv (Swiss federal institute for forest, snow & landscape research (WSL)), presentation “Virgin and old growth forests in Romania – the Romanian national catalogue of virgin forests.

Workshop: Identification and protection of old-growth and virgin forests in (Ukrainian) Carpathians.

December 18 - 21, 2018. Hütscheroda, Germany. Project concluding workshop, Succhov Stiftung. Presentation: „Troubles in Paradise - Light and Shadow with OGF-Preservation in Romania” (by Matthias Schickhofer).

EU’s Old Growth and Primary Forests Under Siege. High level event, EU Parliament, Brussels, September 24, 2019. Presentation about status of forest protection in Romania (by Matthias Schickhofer).

<https://www.saveparadiseforests.eu/en/high-level-event-in-eu-parliament-how-safe-are-eus-natural-forests/>

Presentation “Die letzten großen Urwälder Europas“.- Symposium “Der Wald – Das sind nicht nur Bäume“.- NABU LV Sachsen, 22.-23. Juni 2019, Carlsfeld.

Presentation “Die letzten Urwälder Europas“. Studium generale Universität. Freiburg (Fakultät für Biologie) & Badischer Landesverein für Naturkunde und Naturschutz (BLNN), 07. November 2018, Freiburg.

Presentation „“Wilde Wälder in Europa“ – im Rahmen einer Veranstaltung des Klima-Bündnis, NABU-Bundesverband und der Stadt Tübingen / Projekt Speicherwald, 06 –Juni – 2018, Tübingen.



## 6. Literature:

- BIRIS, I.-A. & VEEN, P. (eds.) (2005): Inventory and strategy for sustainable management and protection of virgin forests in Romania.- ICAS & KNNV Publications (PIN Matra / 2001/018), 58 p.
- BRÄNDLI, U.-B. & DOWHANYTSCH, J. (Hrsg.) (2003): Urwälder im Zentrum Europas.- (Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft, WSL, Birmensdorf, Schweiz & Karpaten-Biosphärenreservat, CBR, Rachiw, Ukraine (Hrsg.), Haupt-Verlag-Bern, 200 S.
- COMMARMOT, B.; BRÄNDLI, U.-B.; HAMOR, F.; LAWNY, V., (eds.) (2013): Inventory of the Largest Primeval Beech Forest in Europe. A Swiss-Ukrainian Scientific Adventure. Birmensdorf, Swiss Federal Research Institute WSL; L'viv, Ukrainian National Forestry University; Rakhiv, Carpathian Biosphere Reserve. 69 pp.- [https://www.researchgate.net/publication/329019447\\_Inventory\\_of\\_the\\_largest\\_primeval\\_beech\\_forest\\_in\\_Europe\\_A\\_Swiss-Ukrainian\\_scientific\\_adventure](https://www.researchgate.net/publication/329019447_Inventory_of_the_largest_primeval_beech_forest_in_Europe_A_Swiss-Ukrainian_scientific_adventure)
- CONSTANTINESCU, A., HANGANU, J., LEHMANN, A. & RAY, N. (2014): Assessment of Romanian alpine habitats spatial shifts based on climate change prediction scenarios.- *Revue Roumaine de Géographie*, 2014, Vol. 58, no. 2, p. 115-127 (<http://archive-ouverte.unige.ch/unige:44096>).
- EARTHSIDE INVESTIGATIONS (2018): Complicit in corruption -How billion-dollar firms and EU governments are failing Ukraine's forests.- 64 p.- [https://vhk-bw.de/wp-content/uploads/2018/08/Anlage\\_2\\_zu\\_RS\\_M%C3%B6bel\\_09\\_2018.pdf](https://vhk-bw.de/wp-content/uploads/2018/08/Anlage_2_zu_RS_M%C3%B6bel_09_2018.pdf)
- EIA (Environmental Investigation Agency) (Stealing the last forest: Austria's largest timber company land rights and corruption in Romania.- Washington, 215 p ([http://eia-global.org/images/uploads/EIA\\_2015\\_Romania\\_Report\\_Final\\_low\\_res.pdf](http://eia-global.org/images/uploads/EIA_2015_Romania_Report_Final_low_res.pdf)).
- KOZAK, J., OSTAPOWICZ, K., BYTNEROWICZ, A. & WYZGA, B. (eds.) (2013): The Carpathians: Integrating Nature and Society Towards Sustainability.- Environmental Science, Springer, 717 p.
- FEURDEAN, A., PARR, C.-L., TANȚĂU, I., FĂRCAȘ, S., MARINOVA, E. & IOANA PERȘOIU, I. (2013): Biodiversity variability across elevations in the Carpathians - Parallel change with landscape openness and land use.- *The Holocene*, doi: 10.1177/0959683612474482.
- FEUREDAN, A. (2005): Holocene forest dynamics in northwestern Romania.- *The Holocene* 15(3), 435-446.
- KNORN, J., KUEMMERLE, T., RADELOFF, V.C., KEETON, W.S., GANCZ, V., BIRIS, I.-A., SVOBODA, M., GRIFFITH, P., HAGATIS, A. & HOSTERT, P. (2012): Continued loss of temperate old-growth forests in the Romanian Carpathians despite an increasing protected area network.- *Environmental Conservation* 40 (2): 182–193 C (doi:10.1017/S0376892912000355).
- NATIONALPARKVERWALTUNG HAINICH & FORSTLICHES FORSCHUNGS- UND KOMPETENZZENTRUM GOTHA (Hrsg.): Wissenschaft im Hainich – Stand und Chancen einer nachhaltigen und langfristigen Forschung in bewirtschafteten und unbewirtschafteten Wäldern.- Tagungsband zur Hainichtagung 2016, Bad Langensalza, 174 S.
- PEARCE, F. (2015): Up in flames - how biomass burning wrecks Europe's forests - Case study report from 4 countries (France, Romania, Slovakia, UK).- FERN Foundation publication, Brussels, 16 p. ([http://www.fern.org/sites/fern.org/files/upinflammes\\_internet.pdf](http://www.fern.org/sites/fern.org/files/upinflammes_internet.pdf)).
- PAILLET, Y., BERGES, L., HJALTEN, J., ODOR, P., AVON, C., BERNHARDT-ROMERMANN, M., BIJLSMA, R.-J., DE BRUYN, L., FUHR, M., GRANDIN, U., KANKA, R., LUNDIN, L., LUQUE, S., MAGURA, T., MATESANZ, S., MESZAROS, I., SEBASTIA, M.-T., SCHMIDT, W., STANDOVAR, T., TOTMERESZ, B., UOTILA, A., VALLADARES, F., VELLAK, K. & VIRTANEN, R. (2009): Biodiversity Differences between Managed and Unmanaged Forests: Meta-Analysis of Species Richness in Europe.- *Conservation Biology*, Volume 24, No. 1, 101–112.
- PAILLET, Y., PERNOT, C., BOULANGER, V., DEBAIVE, N., FUHR, M., GILG, O., & GOSSELIN, F. (2015). Quantifying the recovery of old-growth attributes in forest reserves: A first reference for France. *Forest Ecology and Management*, 346, 51–64. <https://doi.org/10.1016/j.foreco.2015.02.037>.
- PETRITAN, I.C., COMMARMOT, B., HOBI, M.L., PETRITAN, A.M., BIGLER, C., ABRUDAN, I.V. & RIGLING, A. (2015): Structural patterns of beech and silver fir suggest stability and resilience of the virgin

forest Sinca in the Southern Carpathians, Romania.- *Forest Ecology and Management* 356 (2015), 184-195. (doi:10.1016/j.foreco.2015.07.015).

SABATINI, F.-M., BURRASCANO, S., KEETON, W.-S., LEVERS, C., LINDERN, M., PÖTZSCHNER, F., VERKER, P.-J., BAUHUS, J., BUCHWALD, E., CHASKOVSKY, O., DEBAIEVE, N., HORVÁTH, F., GARBARINO, M., GRIGORIADI, N., LOMBARDI, F., DUARTE, I.-M, MEYER, P. MIDTENG, R., MIKAC, S., ÓDOR, P., RUETE, A., SIMOVSKI, B., STILLHARD, J., SVOBODA, M., SZWAGRZKY, J. TIKKANEN, O.-P., VOLOSZYANCHUK, R., VRŠKA, T., TLATONOV, T. & KUEMMERLE, T. (2018): Where are Europe's last primary forests? 1426-1439, John Wiley & Sons Wileys Online Library.- DOI: 10.1111/ddi.12778.

SCHICKHOFER, M. & SCHWARZ U. (2019): Inventory of potential primary and old growth forest areas in Romania (PRIMOFARO). Identifying the largest intact forests in the temperate zone of the European Union.- 84 p.- [https://www.saveparadiseforests.eu/wp-content/uploads/2019/10/PRIMOFARO\\_24092019\\_layouted.pdf](https://www.saveparadiseforests.eu/wp-content/uploads/2019/10/PRIMOFARO_24092019_layouted.pdf)

WIRTH, C., GLEIXNER, G. & HEIMANN, M. (eds.) (2009): Old-Growth Forests – Function, Fate and Value.- *Ecological Studies* 207, Springer, 512 p.



## ***Annex 1: Impressions from project work***



Image 40: Planning of a visit to an unknown primary forest in Fagaras mountains (with Fritz Habekuss, journalist „Die Zeit“). © Matthias Schickhofer



Image 41: Measuring a giant beech tree in Fagaras mountains. © Matthias Schickhofer



Image 42: Drones help to get quick overview about status of a very forest (regarding naturalness, logging impacts, etc.). © Matthias Schickhofer



Image 43: Visit at a permanent study plot of partnering REMOTE forest research project in Fagaras Mountains (with Fritz Habekuss, Die Zeit). © Matthias Schickhofer



Image 44: Walking in pathless and steep terrain (Boia Mica valley). © Matthias Schickhofer



Image 45: Drones are fascinating tools... © Matthias Schickhofer





Image 46: Media interest is high: Max Lebsanft (Bayerischer Rundfunk) interviewing Ion Holban in the great wilderness of Fagaras mountains. © Matthias Schickhofer



Image 47: Joint exploration hike into wild Boia Mica valley with scientists, foresters and residents (owners). © Matthias Schickhofer



Image 48: Giant beech: 6,5 m circumference, more than 400 years old (Boia Mica). © Matthias Schickhofer





Image 49: Taking a tree core with an increment borer (Fritz Habekuss, Die Zeit). © Matthias Schickhofer



Image 50: Meeting the Forest Guards. © Ecaterina Fodor et al



Image 51: Unseen places, hidden in remote valleys (Fagaras mountains). © Matthias Schickhofer