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Destruction of the largest complex of primary forest in EU: the Fagaras Mts.

**report based on fieldwork experience of Martin Mikoláš and Ondrej Kameniar from
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photo by Ondrej Kameniar and Martin Mikoláš, satellite images by Google Earth



Introduction

The REMOTE (REsearch on MOuntain TEMperate) Primary Forests project is a long-term international collaboration based on a network of permanent sample plots in the forests of central, eastern, and southeastern Europe (www.remoteforests.org). Since 2010, our international team has developed a system for monitoring selected remaining primary forests in the region. These primary forests play a key role in providing habitat for many rare species and other important ecosystem functions. From our network of systematic permanent inventory plots, we collected extensive data on forest structure and long-term dynamics of individual trees. Our research team has built one of the largest dendroecological databases in the world including tens of thousands of individual trees. Our overall goal is to contribute to the long-term scientific understanding of primary forests. During the project, we identified several outstanding primary forests in the Fagaras Mts. and established 200 permanent study plots within this mountain range.

Fagaras mountains are unique - according to our knowledge, they host the largest areas of primary forests in entire EU (around 10,000 hectares). To compare - it is the same area as all the primary forests found in the entire Slovak Republic. In addition, other large areas are covered by valuable natural forests, which connect primary forest localities into larger complexes of high naturalness. Therefore, it deserves special attention and conservation.

The outstanding value of Fagaras is in the large continuous primary forest valleys with a complete gradient of altitudinal belts of forest vegetation - from thermophilic beech-hornbeam forests through beech-fir-spruce forests up to spruce and mountain pine. Several primary forest localities are more than 1,000 ha, and usually grow on both sides of the large valleys. Such primary forest valleys almost do not exist in the EU. One of the flagship primary forest valleys in Fagaras is Boia Mică that covers 1145ha with an altitudinal difference of 1,670m (from appr. 750m to 2,427m) over a distance of 7.5 km. We found 37 trees older than 300 years, 10 trees older than 400 years, and 1 tree older than 500 years on 14 randomly selected study plots in Boia Mică.

Primary forest in Fagaras were protected by their inaccessibility - cliffs, waterfalls and steep slopes. When we established our permanent study in Fagaras. 5-7 years ago, long valleys were almost untouched, with no roads and industrial logging. It was hardly accessible wilderness - providing best habitats for large carnivores and many protected species. Primary forests were covering continuously large landscapes.

Unfortunately, in the last few years a lot has changed. This summer (2018) we spent ca 7 weeks of hard fieldwork in order to remeasure the permanent study plots in 9 valleys in the Fagaras Mts. The drastic change in the form of heavy logging of primary forests was shocking for us. New roads appeared, and large clearcuts arose. More than one meter diameter trees, which were growing here for centuries, were logged for timber and firewood. One of the most precious natural localities in the European Union is disappearing rapidly. Moreover, our last visit in Fagaras Mts. ended with punctured tires on our university car. It seems like some people are not comfortable with our research, and they want to frighten us...

Primary forest inventory in Fagaras Mts. was conducted mostly by WWF and identified several thousands ha of primary forests. However, large areas in many valleys were still not included in their mapping, especially due to problematic criteria for primary forest identification in Romania. Even more worrisome, logging is also damaging the forest inside the polygons that are proposed to be included in the Primary forest catalogue. Approximately 3-4 thousand hectares should right now be included in the catalogue by WWF, Greenpeace and Carpathia (http://apepaduri.gov.ro/paduri-virgine/?fbclid=IwAR1F1rk7kIsI5lrDrzv8oRMTXikWAlrHtkto0_Q0WZC8uYlqjNvF_hVoZ30). However, the rest (ca 6-7 thousands ha of primary forests) are under serious

threat of logging. Forest management, particularly large scale clear-cutting and salvage logging, have substantially diminished and fragmented habitats of protected species, regardless of the status of forest protection (NATURA 2000).

Obviously, the chance to protect the complete primary forest complex in Fagaras Mts. is very low. Here we document logging and threats in several primary forest localities in Fagaras Mts. It is important to note, that it is not a complete list and the problem is much wider...

Conclusions

Current speed of destruction of Fagaras primary forest is truly alarming. It is obvious that there is no time for long discussions - one of the most valuable natural places in EU is disappearing before our eyes. Solutions are needed as fast as possible.

If our aim is to conserve Fagaras mountains as a whole, as an exceptionally valuable functional ecosystem, the mapping and submitting of primary forests to the National catalogue is probably not the most efficient way for a variety of reasons. Firstly, it is a very slow process - far slower than deforestation rates. Another point is that not only primary forests are worth protecting - according to current state of scientific knowledge it is clear that if we want to protect biodiversity, natural processes and thus ecosystem services to a sufficient degree, we need to protect large complex areas. Protecting only primary forests will create the same picture like elsewhere in Europe - isolated fragments of primary forests surrounded by clearcuts, unnatural and young secondary forests with damaged soil and biodiversity. This kind of landscape is not able to support us with ecosystem services to a sufficient extent. Fagaras is still unique due to its large unfragmented, untouched or relatively untouched areas, which still ecologically function like one unit. Let's find ways for preserving this treasure!



Fig. 1 Once the primeval forest was endless in Carpathians. Now last great strongholds are threatened already...

Case 1: Valea Arpasul



Fig. 2 Valea Arpasul - Most of the primary forest is already mapped, however, some plots remain outside of the polygons. White - primary forests included in the catalogue (protected), red - unmapped primary forest, red and green dots - permanent study plots.



Fig. 3 A huge forest road has been rebuilt into the valley.



Fig. 4 Lower parts of valley are very well preserved on big vertical gradient from mixed beech - fir - spruce forest through spruce up to alpine vegetation. Valleys such as Arpasul are optimal habitats of brown bears.



Fig. 5 Interior of mixed primary forest, which is not mapped in Valea Arpasul (45° 39.001'N, 24° 40.383'E).



Fig. 6 Large-scale logging was recently conducted just on the borders of primary forest in Arpasul (view from the ridge between Arpasul and Ucea Mare).

Case 2: Ucea Mare

Approximately 200 ha of primary forests was not included in the mapping. New forest roads have been built in the upper part of the valley, logging started in the primary forests, capercaillie lek centre was destroyed. Logging on 3 permanent study plots occurred already. **Recent hotspot of logging in primary forest is here.**

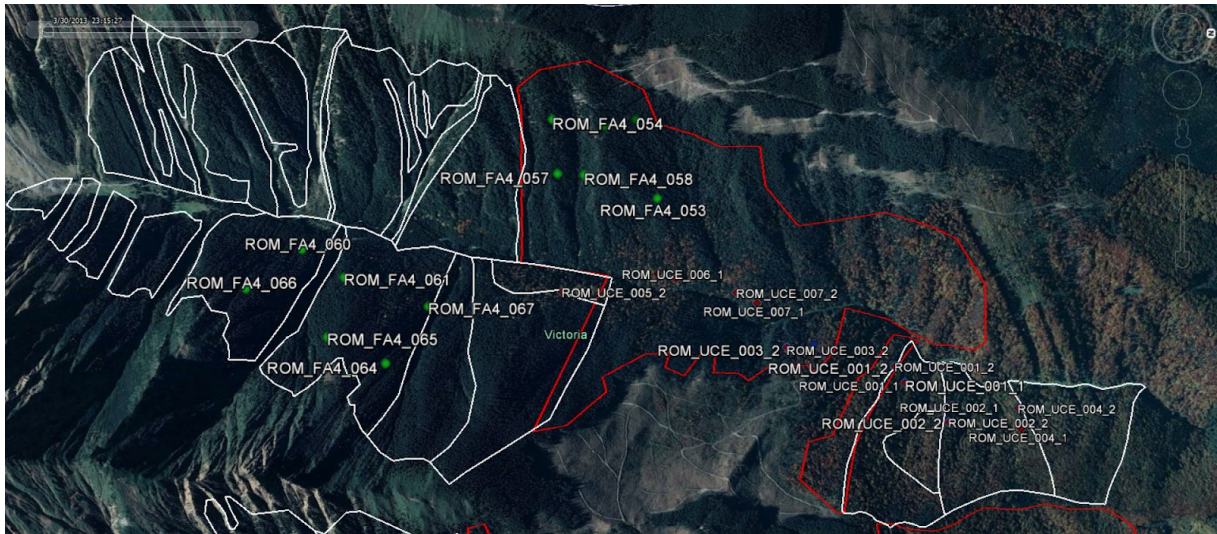


Fig. 7 Ucea Mare - white - WWF polygons, red - unmapped primary forest, red and green dots - our research plots.



Fig. 8 New road through beech-fir-spruce forest to Ucea Mare (45°39.439'N, 24°42.325'E).

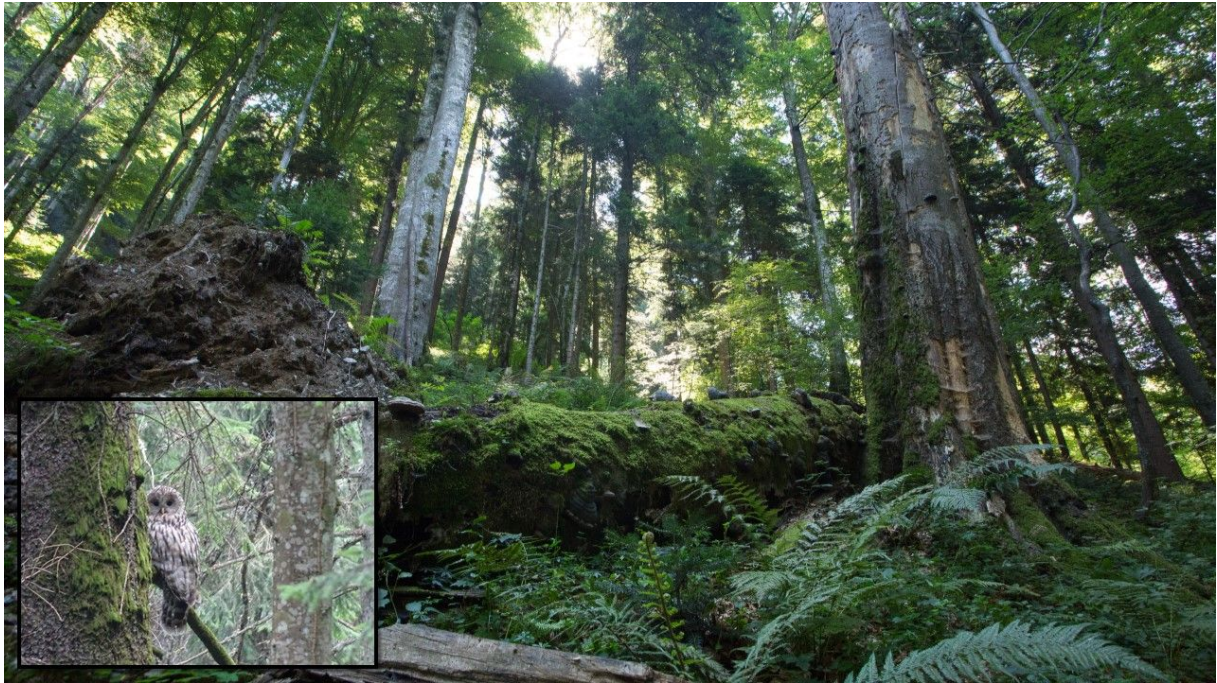


Fig. 9 Unmapped primary forest just few meters from the road (45° 39.521'N, 24° 42.494'E). Presence of the Ural owl (*Strix uralensis*) was documented in the unmapped primary forests.



Fig. 10 Logging of unmapped primary forests on steep slopes, where the permanent study plots were established.



Fig. 11 Roads between the plots in spruce primary forest ($45^{\circ} 38.856'N$, $24^{\circ} 41.720'E$).



Fig. 12 Work on a partially logged plot. The new forest road was constructed just recently on formerly remote slopes ($45^{\circ} 38.876'N$, $24^{\circ} 41.683'E$).



Fig. 13 Interior of a primary spruce forest above our plots, still not mapped ($45^{\circ} 38.752'N$, $24^{\circ} 41.572'E$).

Case 3: Ucisoara

Approximately 100 ha of primary forests has not been mapped. One of our study plots was completely logged, second plot is on a border with a recent clearcut of size ca 20 ha.

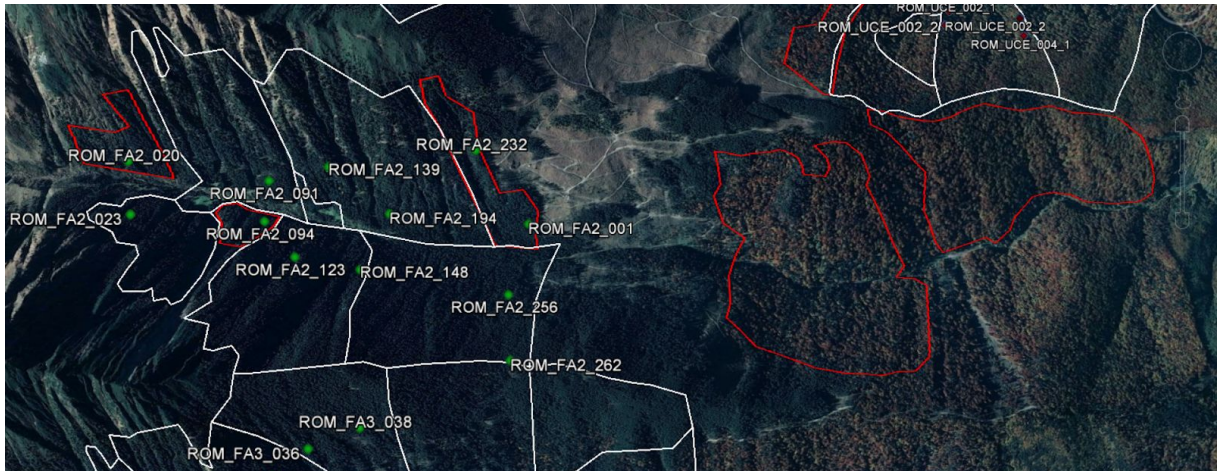


Fig. 14 Current state of mapping and logging in Ucisoara.



Fig. 15 New roads on steep slopes cause erosion and changes in hydrological regime.



Fig. 16 Lower parts of Ucișoara and Ucea Mare in 2012...

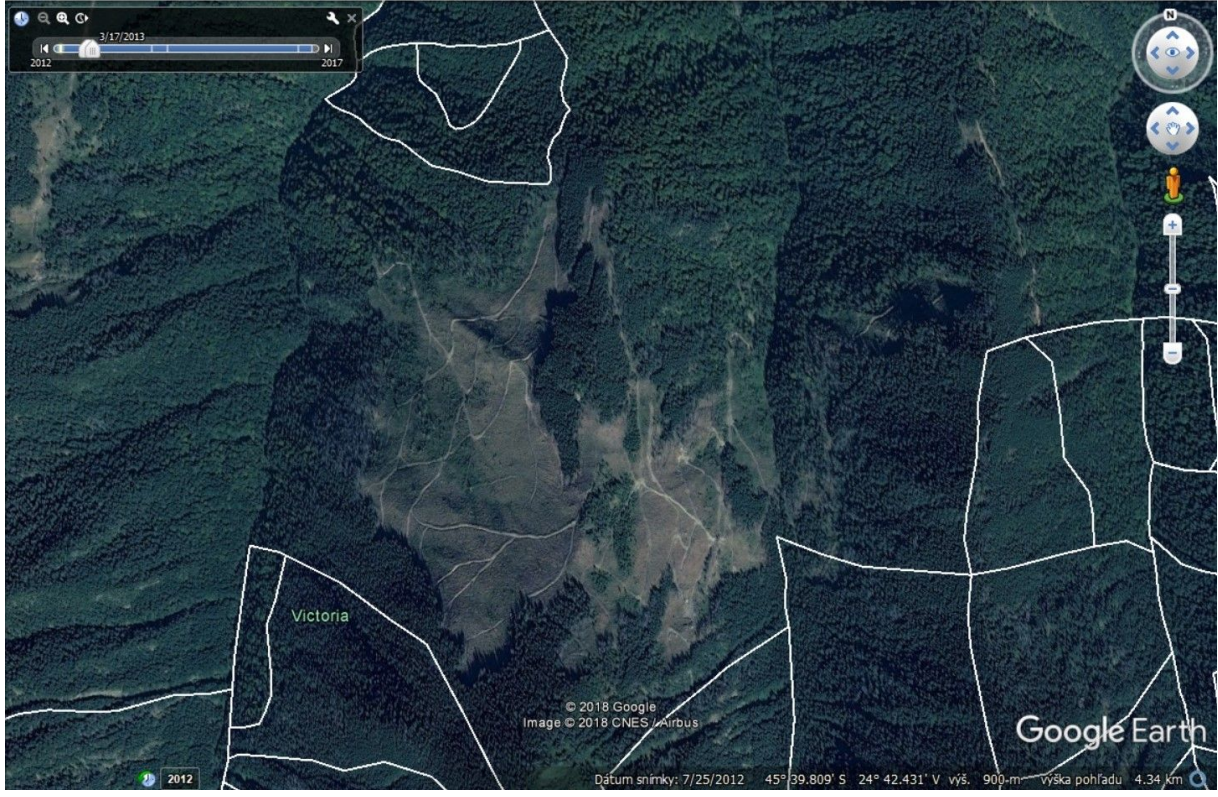


Fig. 17 And now... (2018)



Fig. 18 Only few trees remained on plot n. FA_232 in the primary forest of Ucisoara valley after 5 years since establishment of the plot. 300 years old trees were cut down in this plot (45° 38.699'N, 24° 43.117'E).



Fig. 19 Going through the unmapped beech-fir primary forest in the lower parts of Ucisoara (45°39'30.08"N, 24°43'22.38"E).



Fig. 20 Freshly destroyed primary beech-fir-spruce forest with giant maples (45° 39.309'N, 24° 43.325'E).



Fig. 21 Five years ago no cutting was present here. Now large area of forests on the slope is destroyed. View up to end of valley (45° 39.152'N, 24° 43.298'E).



Fig. 22 View to opposite directions shows, that large areas of primary and natural forests have been damaged on both sides of valley. Large portion of still standing primary forests are still not mapped and thus threatened by logging ($45^{\circ} 39.118'N$, $24^{\circ} 43.295'E$).



Fig. 23 Logging is reaching also the WWF polygons (White polygons) and our plots (red dots).



Fig. 24 New road through (unmapped) primary forest on the eastern side of valley is the clear sign of planned further exploitation of valley (45° 39.496'N, 24° 43.577'E).



Fig. 25 Mixed primary forest around the road threatened by logging (45° 39.403'N, 24° 43.567'E).



Fig. 26 Primary forest with his giant trees is vanishing...

Case 4: Sambata valley

Two of our plots are marked for logging, clear cut already reached up to 30 m to the closest plot.

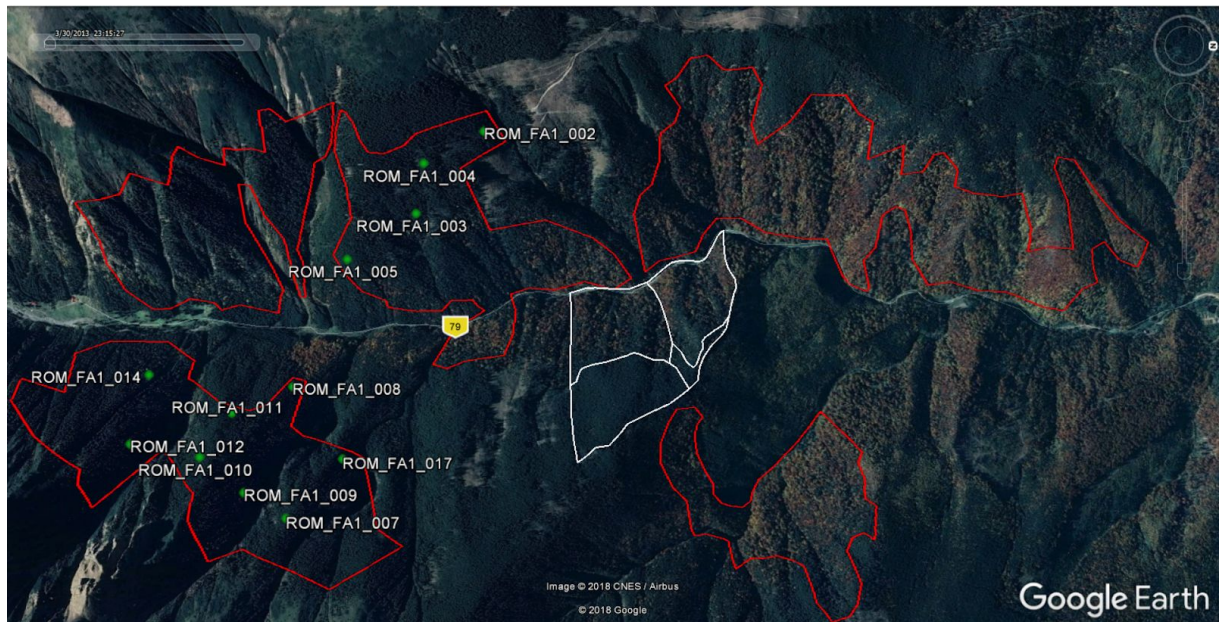


Fig. 27 State of mapping in Sambata. White - WWF polygons, red - unmapped potential primary forest, red dots - our research plots.



Fig. 28 Trees on two of our plots (FA1_002, FA1_004) were marked for logging already (45°38'34.56"N; 24°46'57.39"E).



Fig. 29 A new clearcut just next to the plots (45°38'34.56"N; 24°46'57.39"E).



Fig. 30 Primary forest in Sambata is of same quality like anywhere in Fagaras mountains (45° 38.386'N, 24° 47.559'E). Hazel grouse (*Tetrastes bonasia*) and Three-toed woodpeckers (*Picoides tridactylus*) were documented there.



Fig. 31 Giant trees and preserved natural structure is present in forests across the Sambata valley (45° 38.215'N, 24° 48.129'E).



Fig. 32 Another view into a (not mapped) primary forest in Sambata valley (45° 38.141'N, 24° 47.754'E). Like other predominantly spruce forests, it is the best habitat for Capercaillie (*Tetrao urogallus*), which was also documented here.

Case 5: Belia

Logging occurred on 3 plots. Massive logging occurs outside, but also inside of WWF polygons. During massive logging also scientific equipment was destroyed (dendrometers, dataloggers).



Fig. 33 Freshly made roads into the unmapped primary forest (45° 38.545'N, 24° 58.143'E).



Fig. 34 Not mapped primary forest is destroyed by logging. Roads are now near to our plots, which were in the middle of forest 5 years ago (45° 38.572'N, 24° 58.057'E).

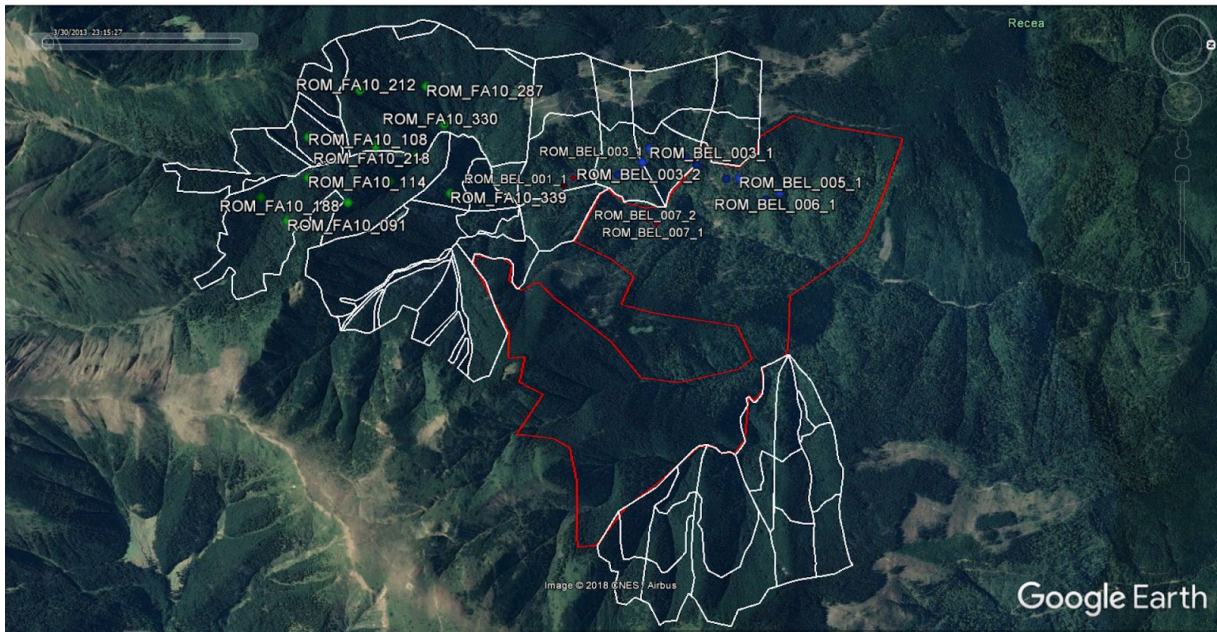


Fig. 35 In Belia, not only unmapped forests are disappearing. You can see, that also the WWF primary forests (white polygons) are logged (ca 20 ha). White - WWF polygons, red - unmapped primary forest, red dots - our research plots.

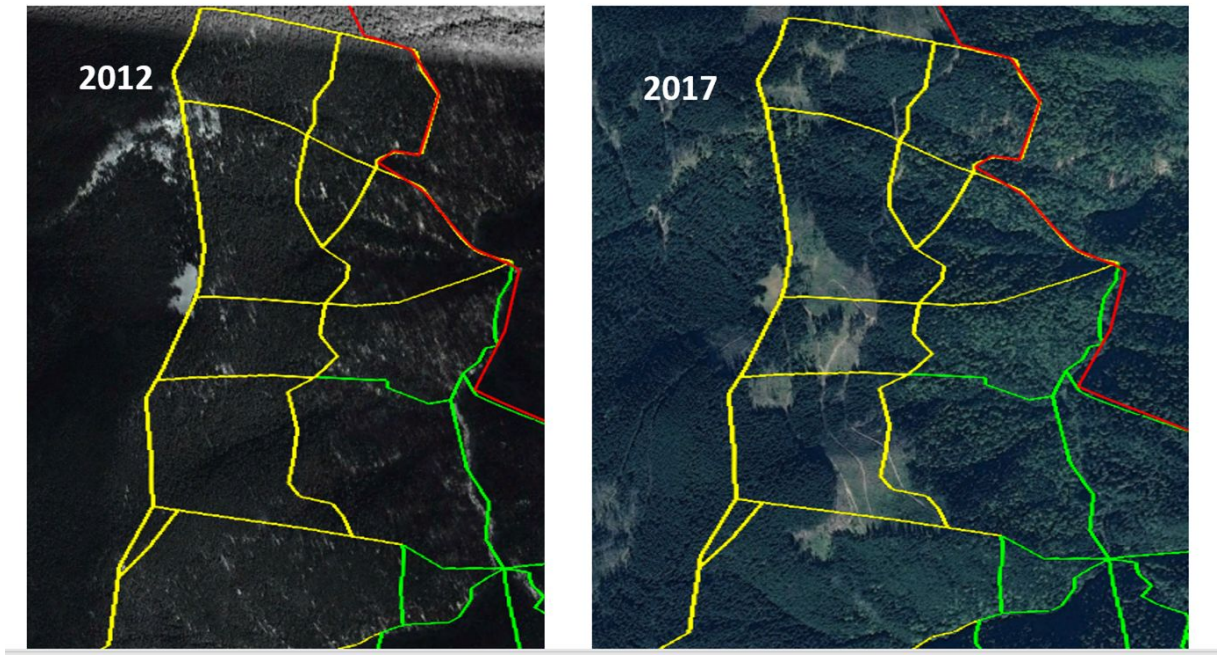


Fig. 36 Zoomed view on logging inside primary forests mapped by WWF. In 2012 there was no single clearcut, in 2017 new roads and more than 20 ha of clearcuts were logged within the primary forests. Forest owners could cut the primary forests, before the studies could be elaborated and compensation were available. Still, to get the primary forests under protection, agreement of the owners is essential. If the owners do not agree, they can continue the logging in primary forests according to the Romanian law..



Fig. 37 Picture from the field. Large clearcuts are spreading inside the primary forests. Habitat of many species is destroyed, among others, Pygmy owl (*Glaucidium passerinum*) was observed here.



Fig. 38 Logging on the research plot (45°38'28.67"N, 24°57'54.11"E).

Case 6: Valea Arpas

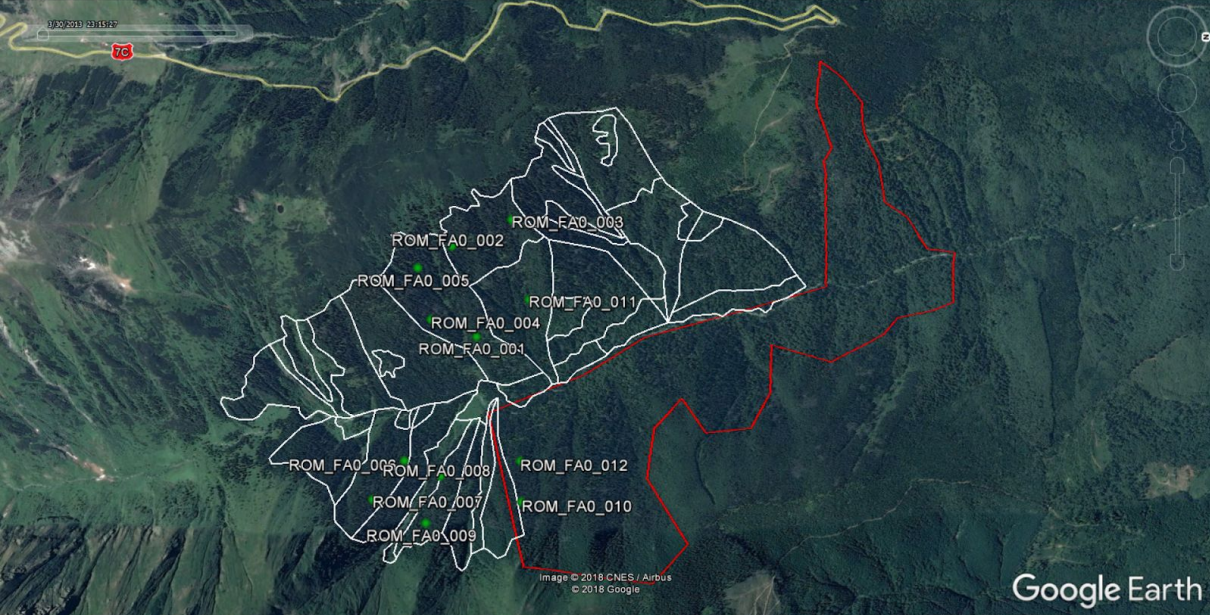


Fig. 39 Large tracts of primary forest are still not mapped in Arpas.

Our research team



Fig. 40 Research team from Department of forest Ecology, July 2018, Ucea Mare.



Fig. 41 Research team from Department of forest Ecology, September 2018, Valea Arpasul.

Threatening of scientists in the field



Fig. 42 It is normal that people have other opinions on nature protection. But puncturing of pneumatics is not normal way how to express it... (Belia valley, near Biserica Berivoii)



Fig. 43 Today it was a damaged car... But what we can expect in the future?

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