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# REPORT

## DEFORESTATION ANALYSIS IN ANAMORAVA

## (GJILAN, VITI & KAMENICA)

## 2000 – 2022*

MOS E MERR MALIN

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Sustainability
Leadership
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# INTRODUCTION

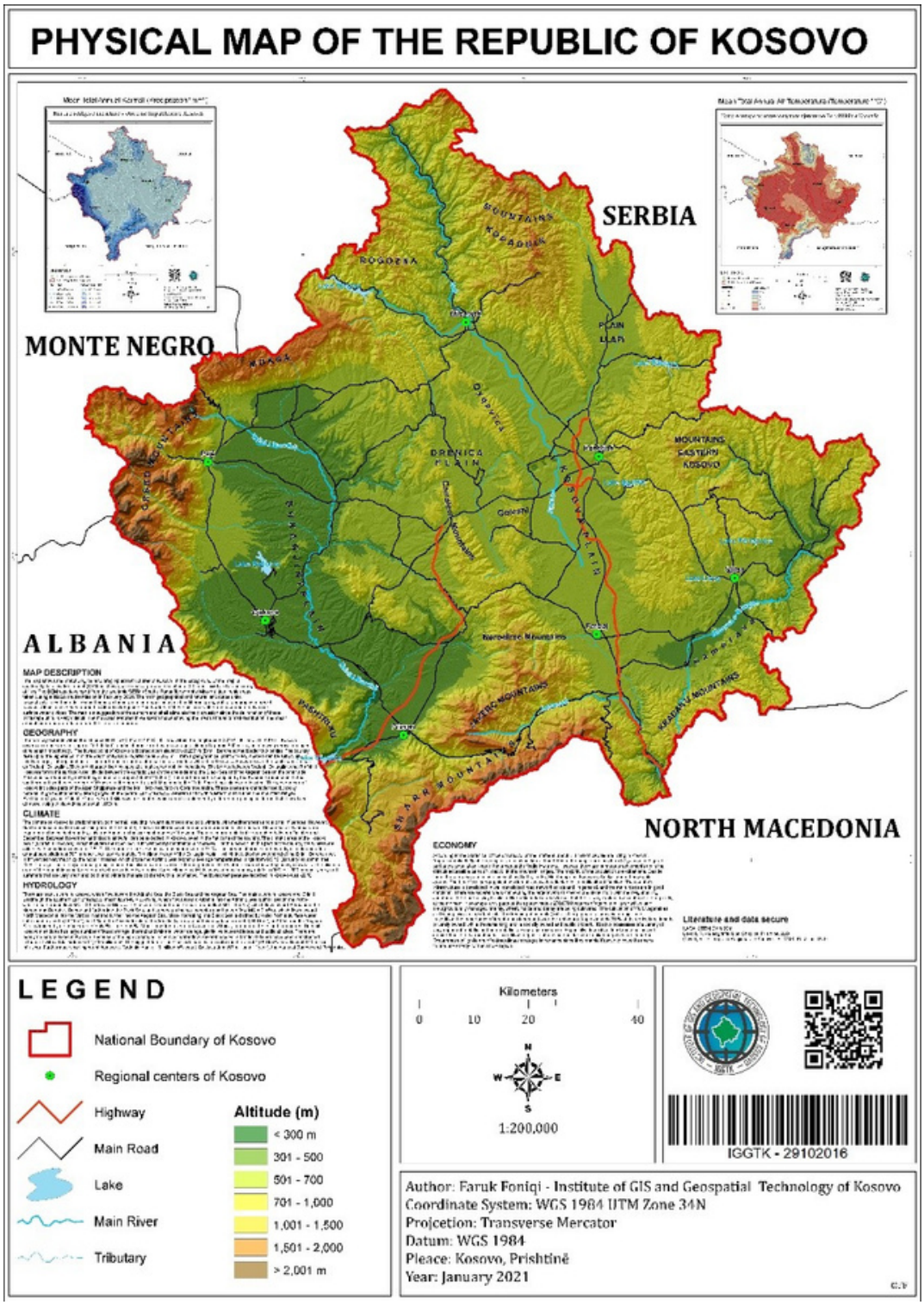



Fig.1 – Physical map of the Republic of Kosovo

# INTRODUCTION

Deforestation analysis is part of the overall analysis of forest loss, a trend which has taken off at an extremely alarming rate in the last two decades. This loss endangers the life of ecosystems, creating unsuitable habitat for flora and fauna in general. Deforestation is the phenomenon by which forests are cut down, cleaned and removed from their primary function for individual or collective purposes, as well as for requirements of various industries for wood material. Forests can also be damaged in other forms besides cutting, such as forest fires, landslides, other damages from climatic causes (acid rain), etc.

Kosovo has a suitable geographical position in the Balkans. It has an area of 10,908 km2. Longitude and geographic latitude are presented on the scales 41° 51' 21- 43° 16' and 19° 59'- 21° 47'. It has a population of 1,771,604 inhabitants, with 38 municipalities and 1469 settlements.

The total length of the border is 743.5 km, boarded by 4 regional countries. The relief is hilly and mountainous with an average altitude of 810 m above sea level (lowest point 270m and highest 2656m). There are two climates that are predominant in Kosovo; Continental climate (Kosovo Plain) and Adriatic climate (Dukagjin Plain).

In the territorial analysis of the Republic of Kosovo, carried out by SLK during the year 2021, it was found that in the period between 2000-2019, Kosovo has lost forests in the value of >654 ha per year, the simplified figure in daily terms falls somewhere around 1.5 football fields lost in one day.

# METHODOLOGY

Remote Sensing technology has been used as part of the methodology applied in the analysis of deforestation in Anamorava region. This analysis has been conducted by satellite and radar images of Landsat 8&9, Sentinel 2&3. Additionally, drone technology has been used in the quality of testing of the selected samples to verify the obtained results.

The methodology used in this research is much more advanced, with the addition of the new features which have been brought by Landsat 9, thus improving the quality of the field data.

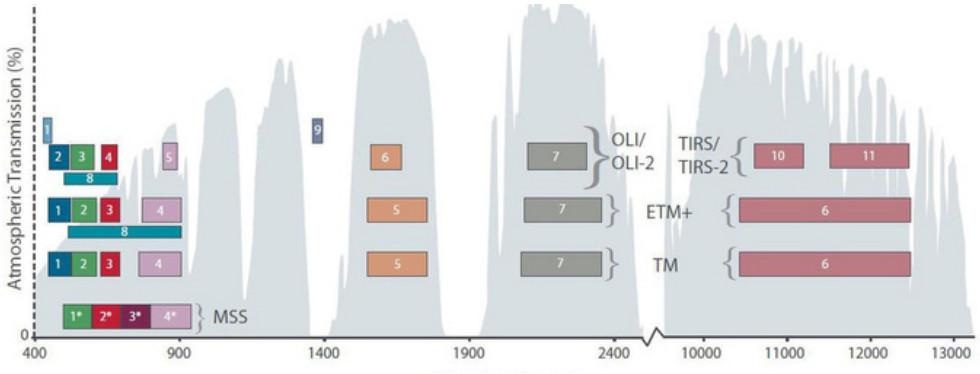



Fig.2 – Percentage of atmospheric transmission from satellites

These advances have enabled us to accurately identify the surfaces that have undergone changes in their natural cover, since the bands/layers offered by Landsat 9 are also in the form of radar images that have an even higher resolution than the band /normal layers.

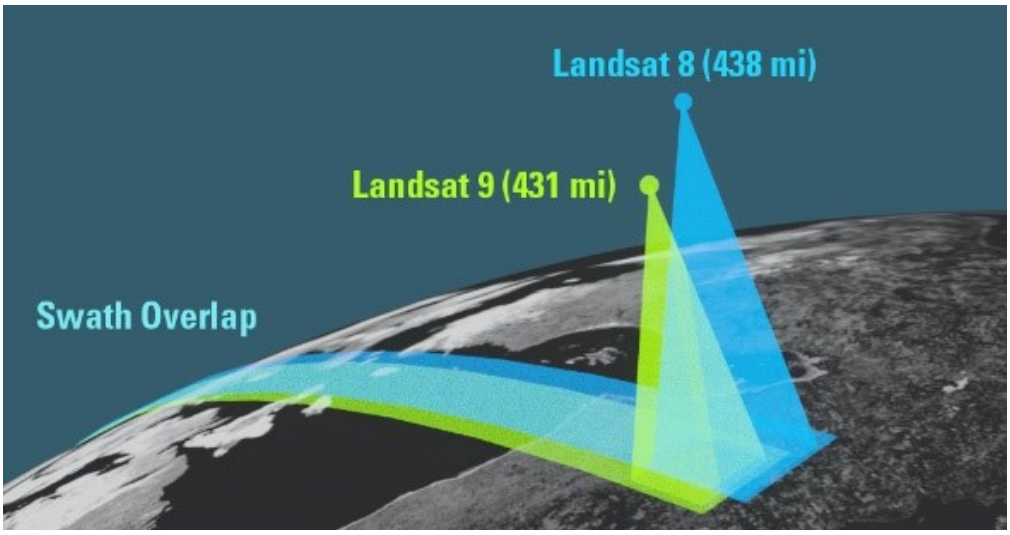



Fig.3 – Coverage of Landsat 8 and Landsat 9 satellites

The images provided by Sentinel 2&3 satellites include data which improve the coverage of specific surfaces, which in our case is the Anamorava region, since this satellite in its orbit covers this space quite well with images. The bands/layers used are categories 5, 7, 8 used in RS science to monitor the vegetative cover in space.

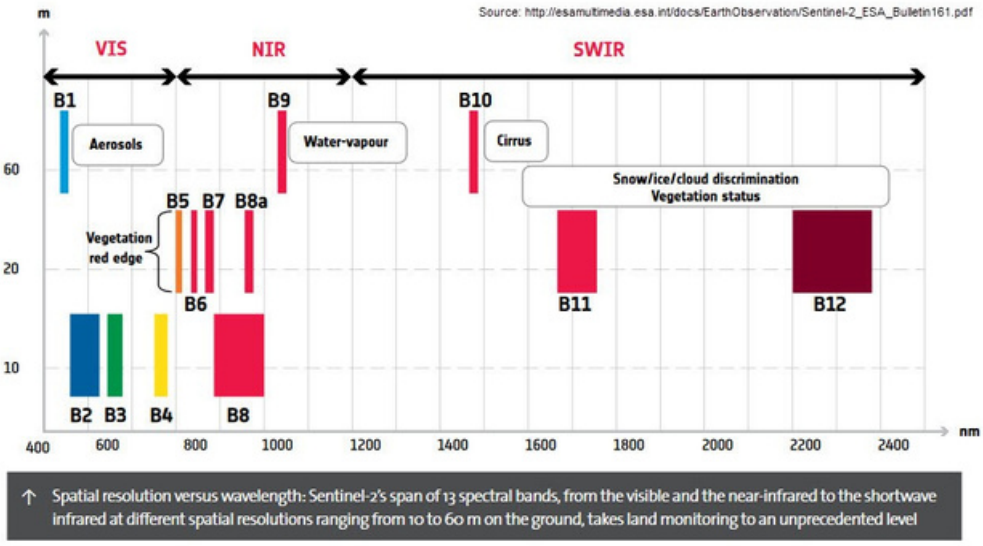
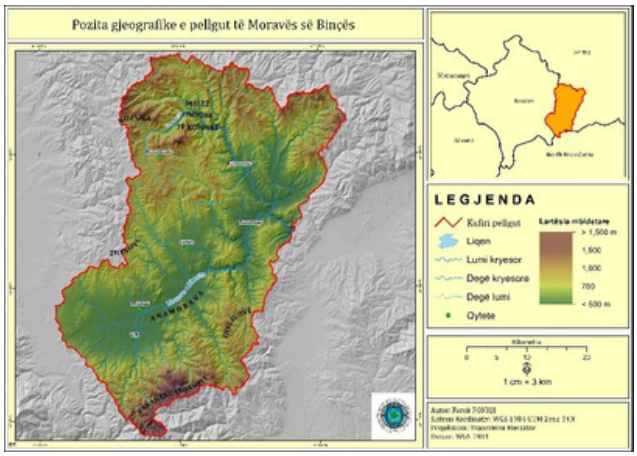



Fig.4 – Spatial resolution versus wavelength - the Sentinel-2 satellite

In addition to these data analysis, the technology of the DJI model drone, Air 2S, has been applied, which has precisely identified the samples selected for testing in this region.

Fig.5 – Drone DJI, Air 2S




Anamorava is a valley in Kosovo, which is located in the southeast of the country, and covers a territory of nearly 10% of Kosovo. This area includes municipalities such as Gjilani, Kamenica, Vitia and some smaller ones such as Parteshi, Kllokoti, Ranillugu.

The reason for selecting this area for analysis were the high figures of deforestation that were recorded in the first part of the research, and at the same time the proximity of the region to the borders of neighboring countries such as Serbia and North Macedonia, directed us to focus on this part.

The analysis is always preceded by receiving existing data from the country's institutions about the current forests, the damage levels, exploitation levels, etc. Based on the data extracted from the satellite images and various reports, it is visible that in this region every year approximately 30,000 to 40,000 $m^3$ of forests of different types are lost in different forms.

During this phase, we as SLK were committed to cooperate with the local institutions for the work that is being developed, but for unknown reasons despite our insistence, we have not found cooperation or any other forms of assistance from their side.

In June 2022, SLK board of directors approved the continuation of deforestation analysis in the Anamorava region, and during the months of July and August, we have obtained the results shown below.

# RESULTS

| Year | Surface (Km²) | Surface (hectars) |
|---|---|---|
| 2000 | 1.12 | 122 |
| 2001 | 1.07 | 107 |
| 2002 | 0.34 | 34 |
| 2003 | 0.49 | 49 |
| 2004 | 1.13 | 113 |
| 2005 | 0.27 | 27 |
| 2006 | 0.65 | 65 |
| 2007 | 0.38 | 38 |
| 2008 | 1.30 | 130 |
| 2009 | 1.47 | 147 |
| 2010 | 1.19 | 119 |
| 2011 | 1.17 | 117 |
| 2012 | 1.71 | 171 |
| 2013 | 0.49 | 49 |
| 2014 | 0.72 | 72 |
| 2015 | 0.61 | 61 |
| 2016 | 1.26 | 123 |
| 2017 | 0.83 | 83 |
| 2018 | 1.02 | 102 |
| 2019 | 1.42 | 142 |
| 2020 | 1.54 | 157 |
| 2021 | 0.77 | 77 |
| 2022* | 0.39 | 39 |
| **Total** | **21.34** | **2144** |

From the results obtained through GIS, it can be concluded that the Anamorava region is one of the most damaged regions by the phenomenon of deforestation in Kosovo. The identification of deforested areas over the years was the first part of the analysis which was carried out, highlighting the level of forest and land damage throughout the Kosovo territory.

Based on the analyzed data, it appears that the Karadak Mountains and the Eastern Mountains of Kosovo are the areas which have been mostly damaged by deforestation. Some of the main reasons why this region is one of the most damaged are: weak monitoring by local and central institutions, lack of forest guards, illegal logging, etc.

Based on the data presented above, it is evident that the total amount of the damaged forest areas during the years 2000-2022* is 21.34 km² or
2,144 ha/forest. *(only the first 6 months of 2022 were analyzed)

The years with the highest values of deforestation are : 2000, 2004, 2009, 2012, 2020 with annual values of forest loss of over 1 km² within a calendar year.

RESULTS

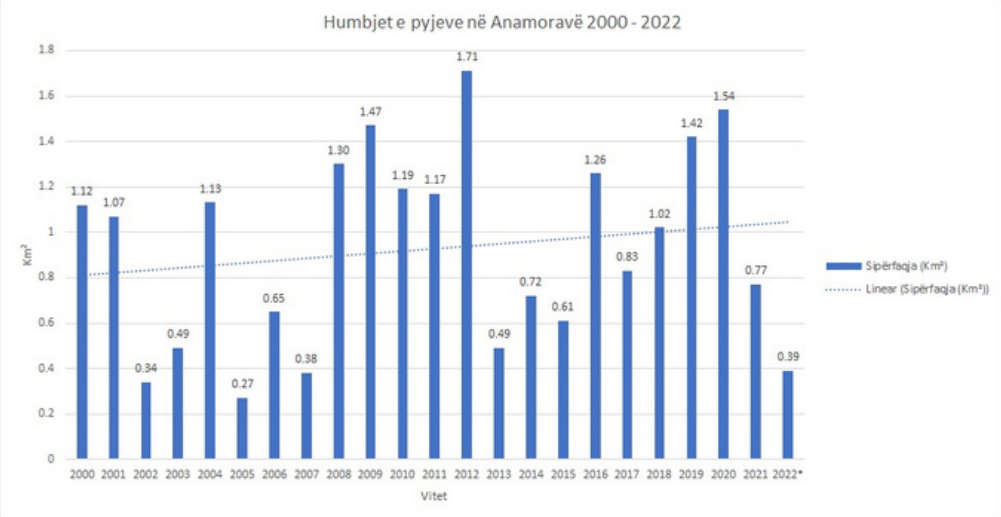



Fig. 6 – Loss of forests in the Anamorava region during the years 2019 - 2022*
* (first 6 months of the year)

The most damaged municipality in the Anamorava region is Vitia, which is surrounded by the Karadak Mountains. This region is also known for the wood industry where illegal logging is very present, thus making this region highly vulnerable in terms of deforestation. Another municipality which is considered a problem area, is Kamenica, which is located in the border zone with Serbia, and where there is little or no state control which makes it a safe haven for illegal loggers.

Below you can find the visual map of the problem areas with high deforestation levels in the Anamorava region;

# RESULTS

# FIELD WORK

In the work plan presented, it has been deemed necessary to collect more images in the field with the help of the drone, thus identifying sites with high deforestation detected by the satellites, whether these losses correspond with the satellite images. From the analyzed results, it can be seen that these surfaces are very damaged in these areas which we selected as test samples.

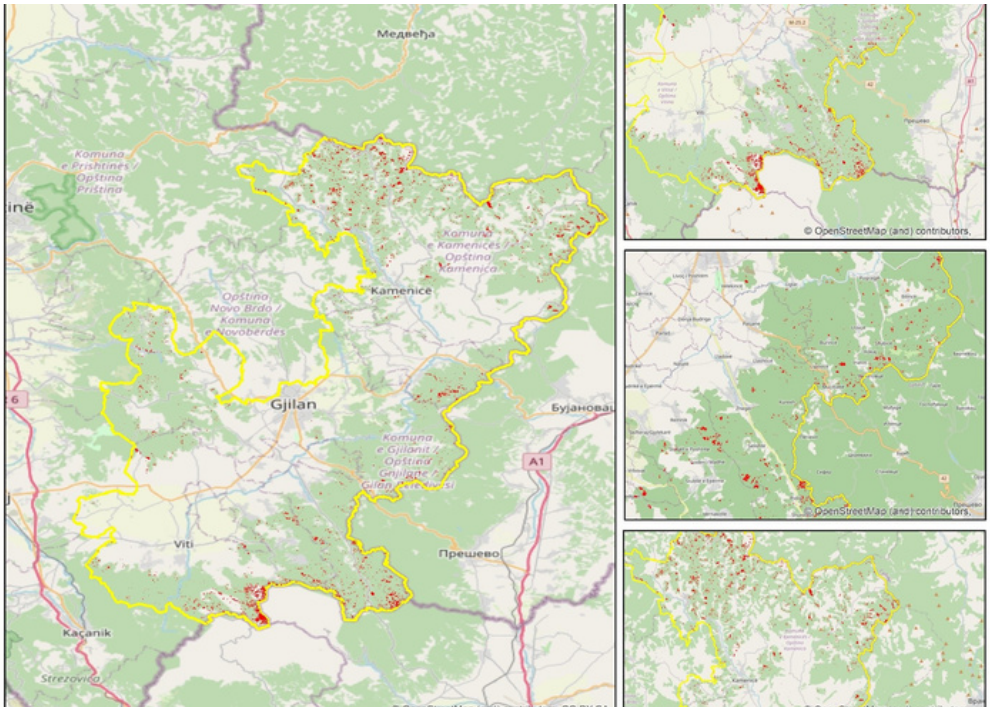
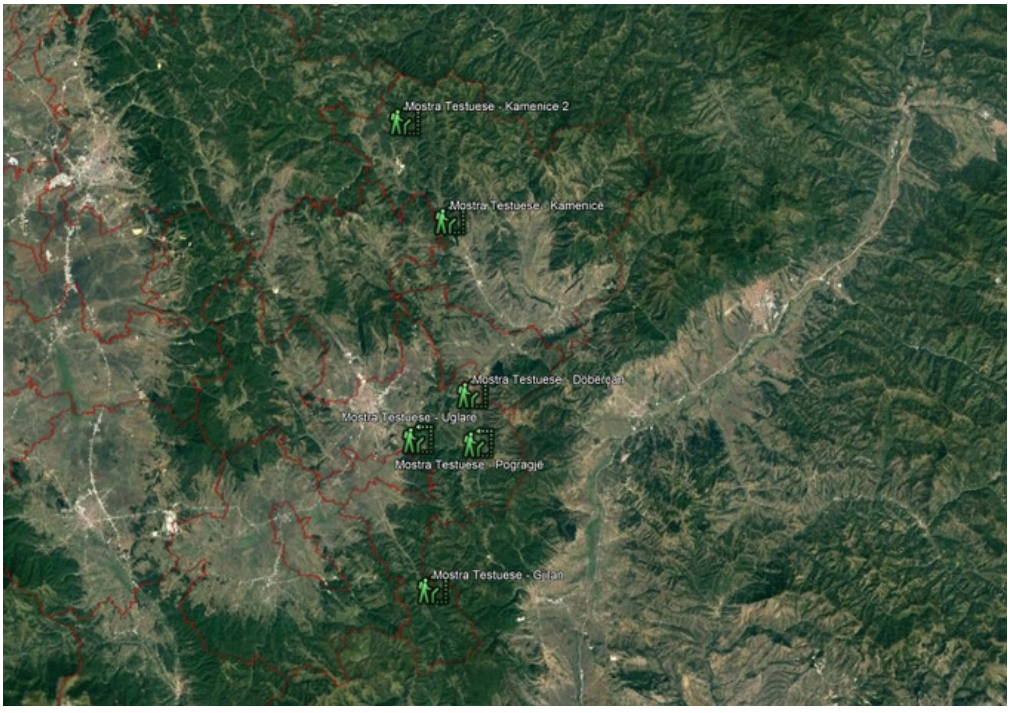



Fig.7 – Problematic deforestation areas in Anamorava




Test samples in Anamorava

# FIELD WORK


Mostra Testuese - Pogragjé
2019


Mostra Testuese - Pogragjé
2022


Mostra Testuese - Uglarë
2019


Mostra Testuese - Uglarë
2022

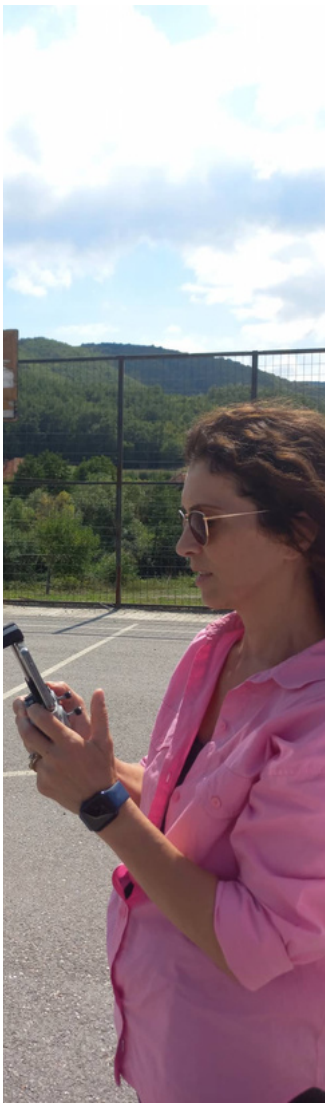
# APPENDIX

Verification of test samples (Karadak Mountains and Eastern Kosovo Mountains)

# APPENDIX

# APPENDIX

Photo from the drone work in the spaces chosen for the test sample in Uglarë and Pograga



# CONCLUSIONS AND RECOMMENDATIONS

Deforestation as a phenomenon has taken off in many different places in the territory of Kosovo, and in particular in the region of Anamorava. This phenomenon is degrading the environment of Kosovo, and as can be seen from our visual and scientific analysis, we have alarming levels of deforestation based on the figures presented above.

The region of Anamorava should have a special focus from the institutions which are responsible for monitoring, analyzing and protecting forests, knowing the importance that they have for the environment and the humans living close to them. Annual forest losses in Anamorava region are nearly 100 ha in one year, which are lost in different forms and ways.

The recommendations that emerge from this analysis are that SLK, with the technology it possesses, should continue to monitor the current situation in the forests of the Anamorava region, continue collecting and processing new satellite images during the second half of 2022; create cooperation bridges with the institutions local, central and local communities for the protection and regeneration of degraded or lost forests. At the same time we hope to continue our efforts to provide drones for remote seeding.

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September, 2022


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