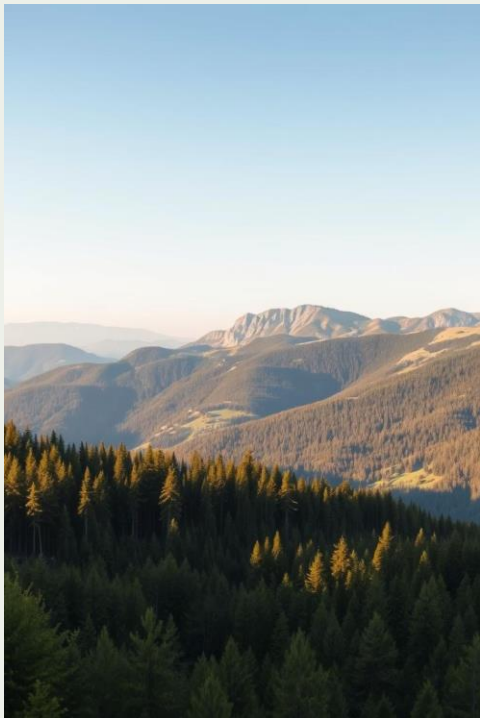


**10th Meeting of the Carpathian Convention Working Group on Sustainable Forest Management  
28-29 April 2025, Bratislava, Slovakia**



# **Corine Land Cover Carpathian land use mapping and monitoring of landscape fires in the region**

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# Overview

1. Mapping of land use of Transcarpathian and Ivano-Frankivsk oblasts with the use of the CORINE Land Cover methodology
2. Monitoring of landscape fires in Carpathian region during war time (2022-2024)
3. Conclusions



# Why to use landscape approach for monitoring of Land Use and wildfires in the Ukrainian Carpathians?

## Climate change & anthropogenic impact

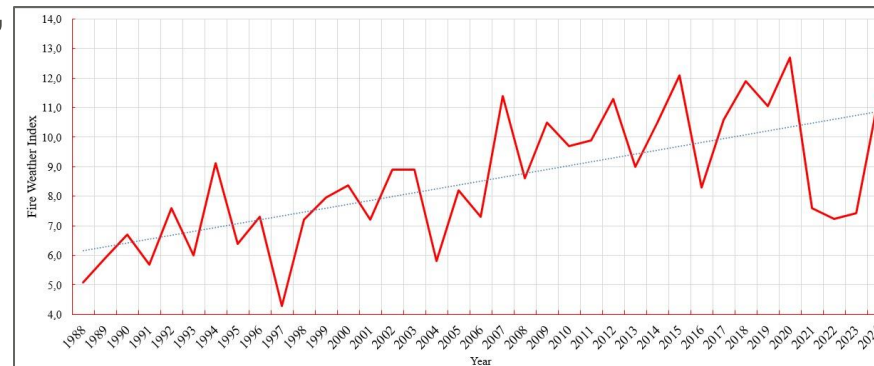
Track natural and anthropogenic transformations across landscapes

## Sustainable Land Use

Use data for decision-making to balance development and conservation effectively

## Landscape fires and disasters prevention

Avoid forest dieback, soil erosion, and reduce disaster risks, including impact of forest fires to settlements

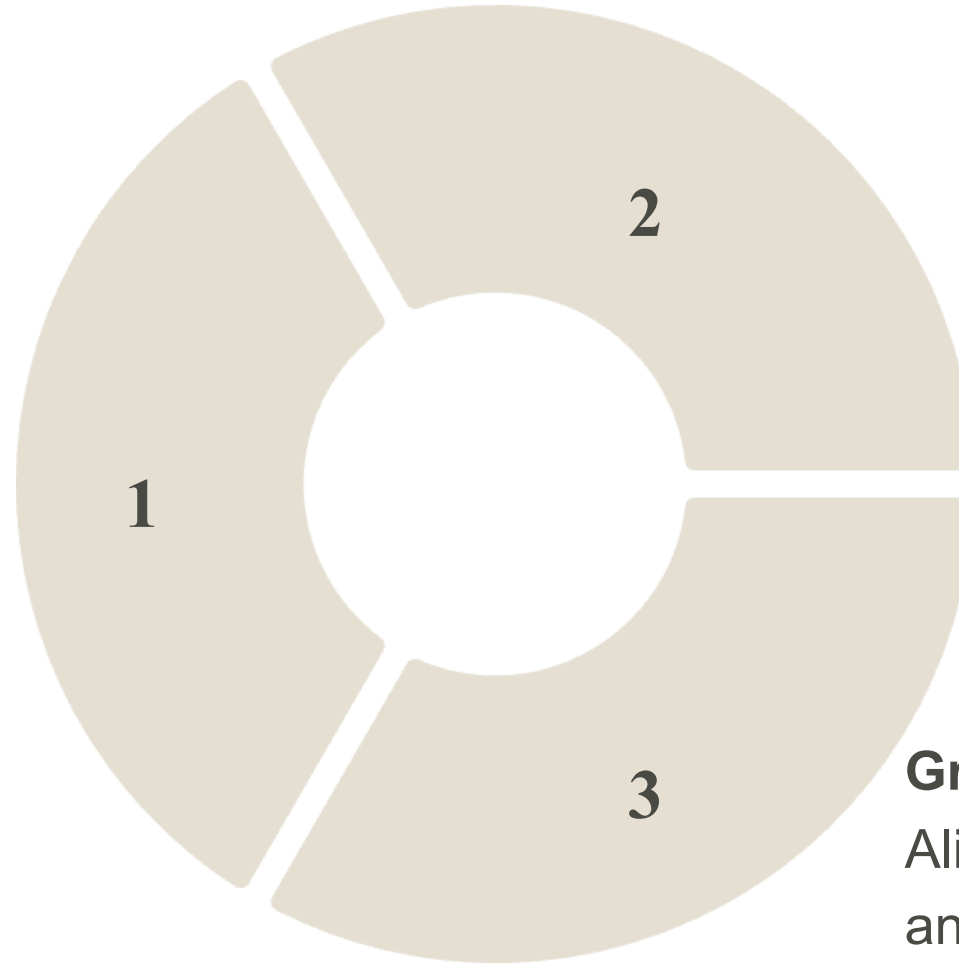


Extreme fire danger (**3399**) in the Carpathian Mountains on 30 of April 2025



## Why This Matters

**Policy Support**  
Enables data-driven  
decisions for regional and  
national planning



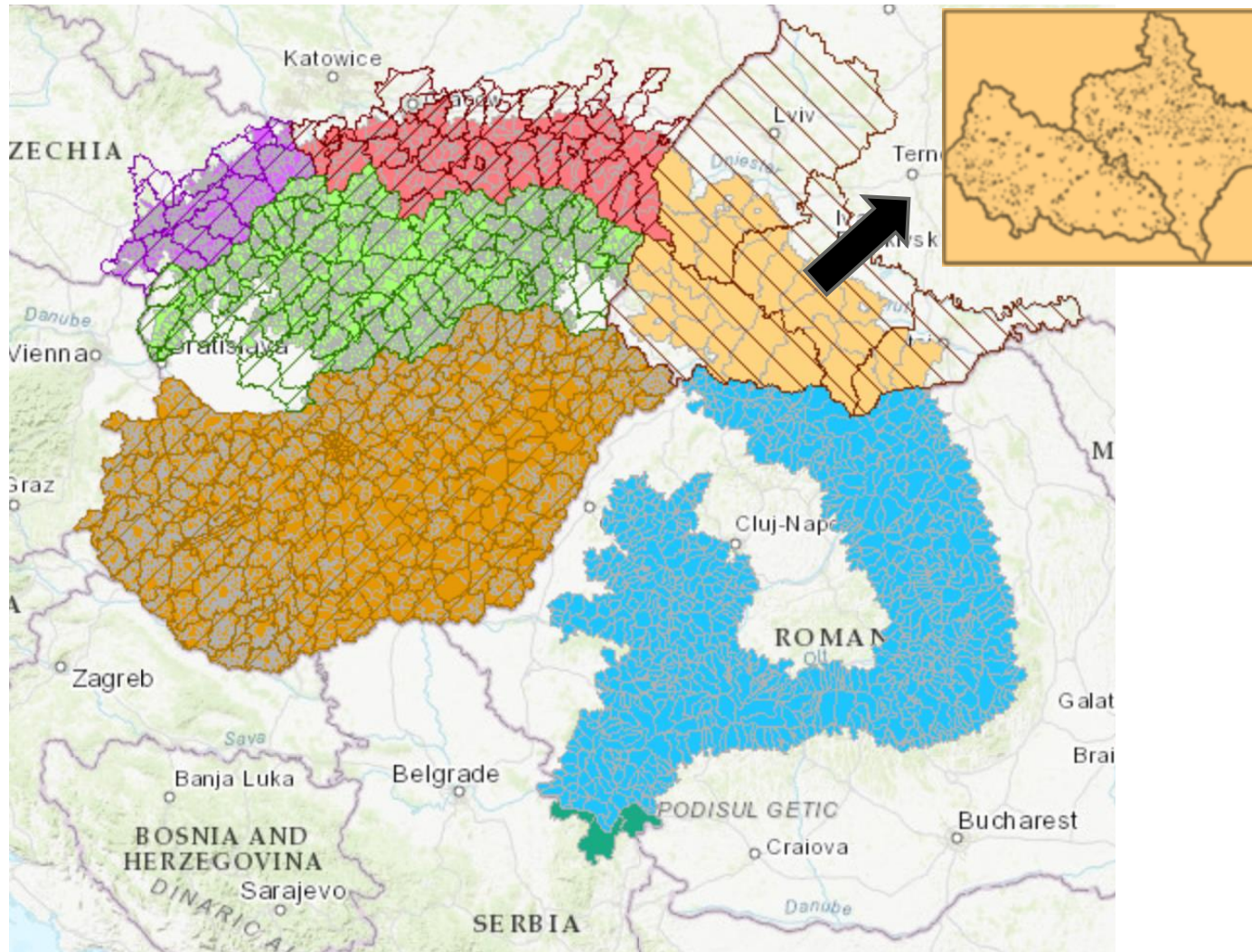
**Disaster Prevention**  
Improves preparedness for  
prevention of landscape  
fires, natural hazards and  
environmental threats

**Green Initiatives**  
Aligns with EU Green Deal  
and sustainable  
development goals





## Focus Area: Ukrainian Carpathians (27 000 sq km). Period: 2018-2023



### Oblasts:

Zakarpattia and Ivano-Frankivsk oblasts are key focus zones

### Strategic Significance:

Vital for environmental monitoring and regional sustainability.

### Ecological Importance:

Diverse habitats supporting rare species and ecology

### Training of the Ukrainian National Team:

Provided by Land Monitoring Specialist  
Dr. Barbara Kosztra





# Corine Mapping Process Overview

## Satellite Data Collection

- Sentinel-2 (2022-2023) were used for the CLC2023 layer
- Sentinel-2 (2017-2018) were used for the CLC2018 layer
- Spring/Autumn and Summer images were used
- to recognize conifer forests vs broadleaves

## Photointerpretation

Ukrainian National Team used [CLC Support Package \(Version 4.1.1\) module InterChange](#) for creation and revision of CLC2023 and CLC2018 and mapping of changes

## Deliverables: two “Status” and one “Change” layers

- CLC2018
- CLC2023
- CLC-Change2018-2023 layers





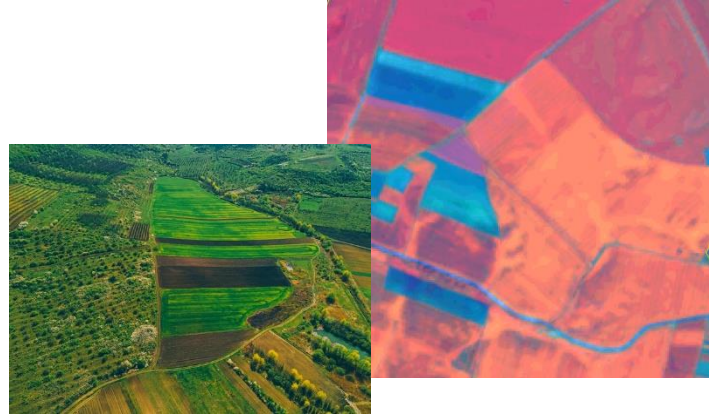
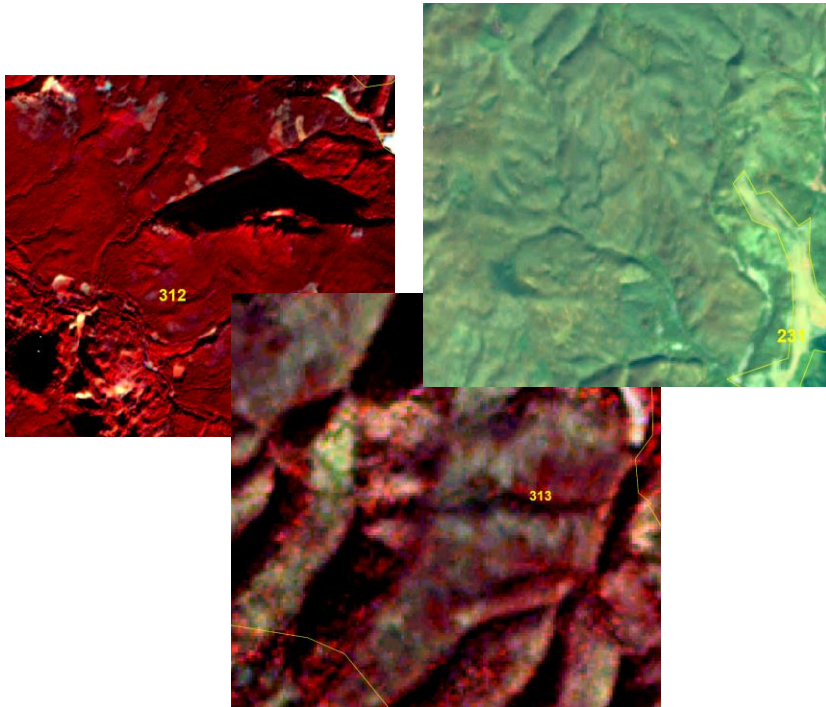




## Key Findings — Status layer CLC2023

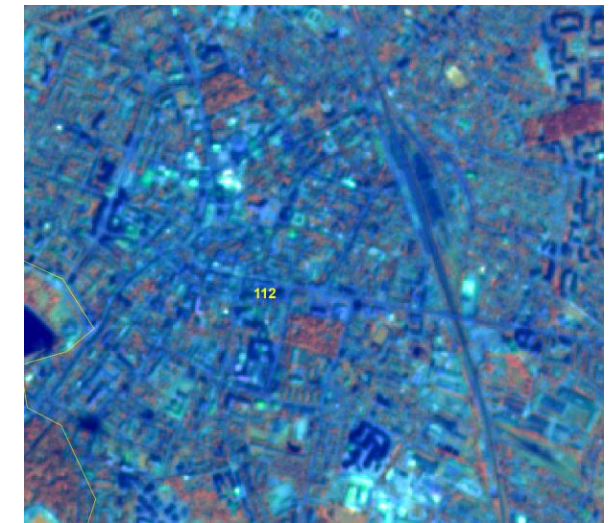
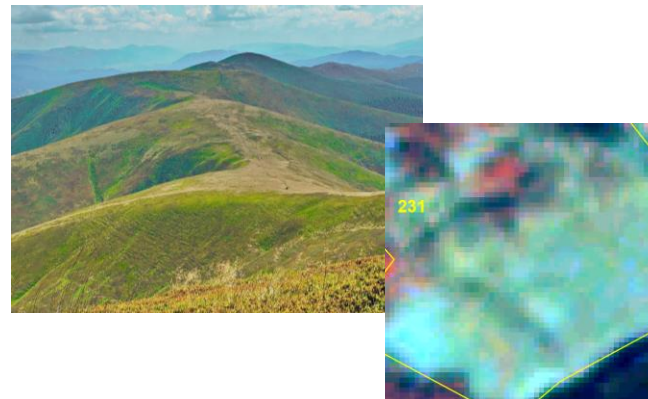
### Forest Area

Over **13,000 sq km (48%)** of forest mapped, which includes coniferous, deciduous and mixed forests



### Agricultural Lands

**7,000 sq km (26%)** including pastures and mosaic classes



### Urban lands

**1,329 sq km (5%).**

Minimal, mainly dispersed housing across the region





## Land Cover Change (2018–2023)

### Area Changed

2.3% of total land cover altered within five years

### Change Trends

Dynamic shifts between agriculture, forest, and urban land

### Sample Transitions

Pasture converting to arable land and forest transitioning to transitional woodland/shrubs

### CLC2023 statistics

| Class code | Class name                                                                            | Zakarpattia (sq km) | Ivano-Frankivsk (sq km) | Total area (sq km) |
|------------|---------------------------------------------------------------------------------------|---------------------|-------------------------|--------------------|
| 112        | Discontinuous urban fabric                                                            | 468,1               | 738,0                   | 1206,1             |
| 121        | Industrial or commercial units and public facilities                                  | 28,6                | 56,5                    | 85,1               |
| 211        | Non-irrigated arable land                                                             | 1077,5              | 2589,6                  | 3667,1             |
| 231        | Pastures, meadows and other permanent grasslands under agricultural use               | 587,8               | 668,0                   | 1255,8             |
| 242        | Complex cultivation patterns                                                          | 885,2               | 1379,7                  | 2264,9             |
| 243        | Land principally occupied by agriculture with significant areas of natural vegetation | 1785,4              | 1491,4                  | 3276,8             |
| 311        | Broad-leaved forest                                                                   | 3658,4              | 1427,9                  | 5086,3             |
| 312        | Coniferous forest                                                                     | 1174,9              | 2859,6                  | 4034,5             |
| 313        | Mixed forest                                                                          | 2077,5              | 1841,5                  | 3919               |
| 321        | Natural grassland                                                                     | 178,1               | 40,3                    | 218,4              |
| 324        | Transitional woodland / shrub                                                         | 713,5               | 561,7                   | 1275,2             |
| Total      |                                                                                       | 12760,3             | 13933,8                 | 26694,1            |



# Land Cover Change within CORINE classes during 2018–2023, ha (total areas of changes 61 892,25 ha)

| Artificial surfaces |                          |
|---------------------|--------------------------|
| Change label        | Area of change type (ha) |
| 112--133            | 10,23                    |
| 112--211            | 5,49                     |
| 112--231            | 6,87                     |
| 112--242            | 13,07                    |
| 112--243            | 11,5                     |
| 112--324            | 6,09                     |
| 121--133            | 54,01                    |
| 121--211            | 35,22                    |
| 121--222            | 9,91                     |
| 121--231            | 438,3                    |
| 121--242            | 26,71                    |
| 121--243            | 18,95                    |
| 121--324            | 64,98                    |
| 124--231            | 25,21                    |
| 131--211            | 7,33                     |
| 131--231            | 13,8                     |
| 131--242            | 5,89                     |
| 131--243            | 5,47                     |
| 131--324            | 5,59                     |
| 133--231            | 25,67                    |
| 133--243            | 8,83                     |
| 141--231            | 9,53                     |
| 142--231            | 11,74                    |
| <b>Total</b>        | <b>820,39</b>            |

| Agricultural areas |                 |
|--------------------|-----------------|
| 211--121           | 47,32           |
| 211--131           | 28,42           |
| 211--221           | 193,71          |
| 211--222           | 96,91           |
| 211--231           | 23615,92        |
| 211--242           | 18183,7         |
| 211--243           | 656,92          |
| 211--324           | 460,3           |
| 221--211           | 46,75           |
| 222--211           | 263,5           |
| 222--231           | 104,24          |
| 222--242           | 6,53            |
| 222--324           | 33,65           |
| 231--211           | 910,41          |
| 231--222           | 19,86           |
| 231--242           | 1485,76         |
| 231--243           | 25,11           |
| 231--312           | 63,9            |
| 231--313           | 32,71           |
| 231--324           | 13,3            |
| 231--512           | 26,76           |
| 242--112           | 15,83           |
| 242--121           | 51,12           |
| 242--211           | 187,62          |
| 242--222           | 5,97            |
| 242--231           | 1568,25         |
| 243--211           | 27,17           |
| 243--222           | 11,21           |
| 243--231           | 399,8           |
| 243--242           | 36,54           |
| 243--311           | 68,98           |
| 243--312           | 238,85          |
| 243--313           | 51,98           |
| 243--324           | 21,7            |
| 243--511           | 19,63           |
| <b>Total</b>       | <b>49020,33</b> |

| Forests and seminatural areas |                 |
|-------------------------------|-----------------|
| 311--112                      | 36,63           |
| 311--242                      | 41,65           |
| 311--243                      | 50,65           |
| 311--313                      | 562,31          |
| 311--324                      | 149,07          |
| 311--511                      | 93,18           |
| 312--243                      | 14,78           |
| 312--313                      | 10,87           |
| 312--324                      | 357,22          |
| 313--231                      | 9,74            |
| 313--243                      | 34,33           |
| 313--311                      | 100,08          |
| 313--312                      | 436,05          |
| 313--324                      | 65,94           |
| 324--222                      | 25,4            |
| 324--231                      | 319,85          |
| 324--243                      | 220,25          |
| 324--311                      | 1 897,24        |
| 324--312                      | 5685,87         |
| 324--313                      | 1482,11         |
| 324--331                      | 9,64            |
| 324--511                      | 37,39           |
| 331--324                      | 13,66           |
| <b>Total</b>                  | <b>11653,91</b> |

| Wetlands and water bodies |               |
|---------------------------|---------------|
| 411--231                  | 64,79         |
| 411--512                  | 21,8          |
| 511--211                  | 6,45          |
| 511--243                  | 33,03         |
| 511--311                  | 52,9          |
| 511--324                  | 97,9          |
| 512--121                  | 7,97          |
| 512--231                  | 55,03         |
| 512--243                  | 10,03         |
| 512--312                  | 9,8           |
| 512--324                  | 22,03         |
| 512--411                  | 15,89         |
| <b>Total</b>              | <b>397,62</b> |

## 44 thematic land classes of CORINE Land Cover

+ 1. Artificial Surfaces

+ 2. Agricultural areas

- 3. Forest and seminatural areas

+ 3.1 Forest

+ 3.2 Shrub and/or herbaceous vegetation associations

+ 3.3 Open spaces with little or no vegetation

+ 4. Wetlands

+ 5. Water bodies

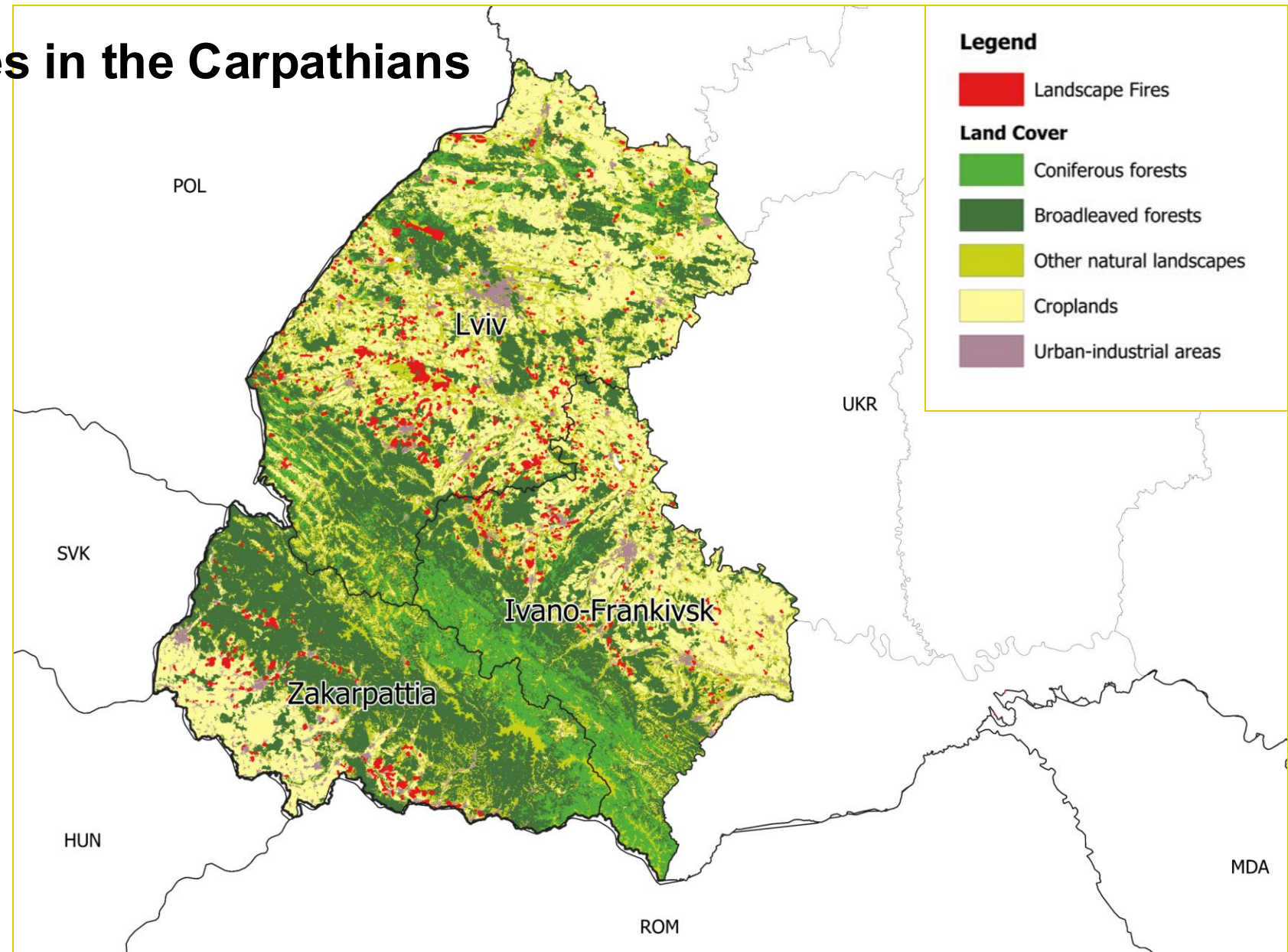




## Landscape Fires in the Carpathians

During 2022 - 2024 in the Carpathian regions (Ivano-Frankivsk, Zakarpattia, and Lviv oblasts) occurred 1 200 fires that burned area of 63 500 ha.

From them - area of forest fires reached 4 700 ha

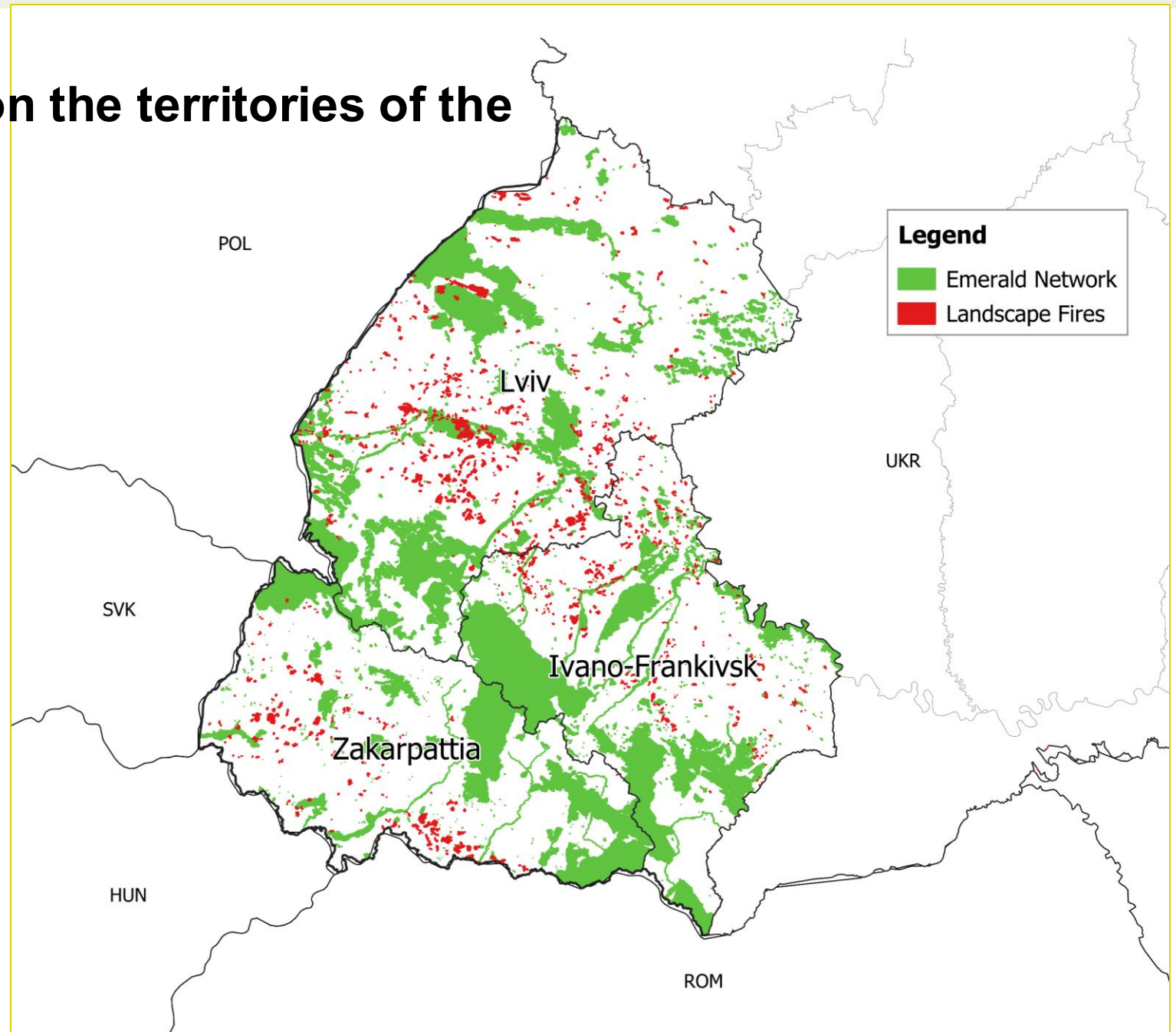




## Landscape Fires on the territories of the Emerald Network

During the war time on the territories of the Emerald Network occurred 66 fires burned total area of 7100 ha, including forest fires burned 743 ha

Source: REEFMC





## Landscape fires by administrative oblasts and types of land use during 24.02.2022-31.12.2024

| Oblast                 | Numbers of fires | Area of fires, ha | Distribution of fire area by types of landscapes, ha |                    |                    |                          |             |
|------------------------|------------------|-------------------|------------------------------------------------------|--------------------|--------------------|--------------------------|-------------|
|                        |                  |                   | Forests                                              | Thereof coniferous | Agricultural lands | Other natural landscapes | Settlements |
| <b>Zakarpattia</b>     | <b>231</b>       | <b>13649</b>      | <b>1849</b>                                          | <b>5</b>           | <b>8189</b>        | <b>3508</b>              | <b>103</b>  |
| 2022                   | 208              | 13078             | 1811                                                 | 0                  | 7734               | 3433                     | 100         |
| 2023                   | 14               | 469               | 13                                                   | 0                  | 408                | 46                       | 2           |
| 2024                   | 9                | 102               | 25                                                   | 5                  | 47                 | 29                       | 1           |
| <b>Ivano-Frankivsk</b> | <b>399</b>       | <b>12239</b>      | <b>808</b>                                           | <b>2</b>           | <b>5530</b>        | <b>5753</b>              | <b>148</b>  |
| 2022                   | 360              | 11215             | 790                                                  | 2                  | 4959               | 5347                     | 119         |
| 2023                   | 16               | 580               | 2                                                    | 0                  | 360                | 197                      | 21          |
| 2024                   | 23               | 444               | 16                                                   | 0                  | 211                | 209                      | 8           |
| <b>Lviv</b>            | <b>598</b>       | <b>37567</b>      | <b>2110</b>                                          | <b>61</b>          | <b>12108</b>       | <b>23044</b>             | <b>305</b>  |
| 2022                   | 518              | 35038             | 2040                                                 | 60                 | 11462              | 21236                    | 300         |
| 2023                   | 49               | 1319              | 41                                                   | 0                  | 462                | 813                      | 3           |
| 2024                   | 31               | 1210              | 29                                                   | 1                  | 184                | 995                      | 2           |
| <b>Total</b>           | <b>1228</b>      | <b>63455</b>      | <b>4767</b>                                          | <b>68</b>          | <b>25827</b>       | <b>32305</b>             | <b>556</b>  |





## Landscape fires in the Carpathians by month of fire season during 24.02.2022-31.12.2024

| Month     | Numbers of fires | Total area | Distribution of fire area by types of landscapes, ha |                    |                    |                          |             |
|-----------|------------------|------------|------------------------------------------------------|--------------------|--------------------|--------------------------|-------------|
|           |                  |            | Forest fires                                         | Thereof coniferous | Agricultural lands | Other natural landscapes | Settlements |
| January   | 1                | 5          | 2                                                    | 0                  | 0                  | 3                        | 0           |
| February  | 8                | 882        | 25                                                   | 0                  | 236                | 620                      | 1           |
| March     | 1034             | 57924      | 4409                                                 | 61                 | 23775              | 29238                    | 502         |
| April     | 61               | 1415       | 207                                                  | 6                  | 617                | 571                      | 20          |
| May       | 69               | 1849       | 74                                                   | 0                  | 474                | 1299                     | 2           |
| June      | 6                | 103        | 0                                                    | 0                  | 55                 | 23                       | 25          |
| July      | 21               | 621        | 32                                                   | 0                  | 363                | 226                      | 0           |
| August    | 20               | 439        | 18                                                   | 1                  | 269                | 150                      | 2           |
| September | 6                | 201        | 0                                                    | 0                  | 31                 | 166                      | 4           |
| October   | 2                | 16         | 0                                                    | 0                  | 7                  | 9                        | 0           |

Source: REEFMC



## Conclusions

1. Mapping of land use with CORINE Land Cover shows that main land classes are forests (48%), agriculture lands (26%) and urban territories (5%).
2. During 2018-2024 in total 2,3% of lands changed their land classes, mainly, due to converting of “pastures” to “arable lands” and closed “forests” to open woodlands/shrublands
3. During 2022-2024, 1200 landscape fires burned 63500 ha, including 4700 ha of forests and 7100 ha of ecosystems within Emerald Network
4. Forest fires impacted mostly broadleaves that are not fire resistant. Highest preparedness for fire suppression must be organized during February - May. Local communities near forests must be trained to defense their settlements from fires.
5. Cumulative impact of climate change, war and land use change in the Carpathians M-s increase probability of natural disasters in forests and threaten to biodiversity and landscapes that require include of those aspects in the regional planning

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**Thanks for your attention!**

