GIS and GPS technologies to implement Natura 2000 network in Romania

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Geographic Thinking

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Agenda

- Objectives
- Project Highlights
- Equipments used
- Business cases

Objectives

Phare Project – Investment support for the Natura2000 network

- Protected areas for the protection of animals, plants and habitats in Europe
- Preserve on long-term these habitats and species
- Restore them if necessary in order to achieve a favorable conservation status
- Natura2000 network
  - covers about 20% of the European Union territory
  - based on the EU Directives on Habitats, no. 92/43/EEC and Birds, no. 79/409/EEC
- Provide decision support for creation of the Integrated National Register species of flora, fauna and natural habitats in Romania of community interest

Beneficiaries

Phare Project – Investment support for the Natura2000 network

- **Ministry of Environment and Forestry**
- **8 Regional Environmental Protection Agencies**
- **26 Administrations of the National and Natural Parks**

Equipment used

Phare Project – Investment support for the Natura2000 network

- Trimble GPS equipments
  - 35 Pathfinder ProXH wtih Recon datalogger and Zephyr Antenna Kit
  - 269 Pathfinder ProXT wtih Recon datalogger
  - 304 GPS correct extension for ESRI ArcPad
  - 35 GPS Pathfinder Office software
- ESRI software
  - ArcView Single Use
  - ArcPad

MARAMURES NATURAL PARK

BUSINESS CASE

Project highlights

Maramures Natural Park

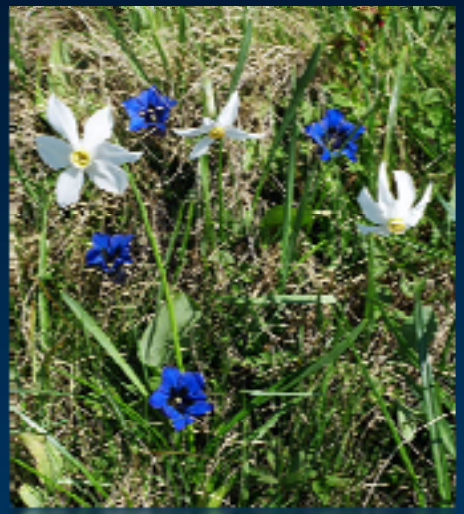
- Increased efficiency – only 50 seconds per feature and relevant attributes

- Easy to use by rangers after 4 days of training – to collect, post-process and load GPS measurements into Geodatabase
- Recon handheld rugged design and all-day battery life
- Reliable even in toughest working conditions (extreme temperatures, humidity, drops)

Project highlights – cont.

Maramures Natural Park

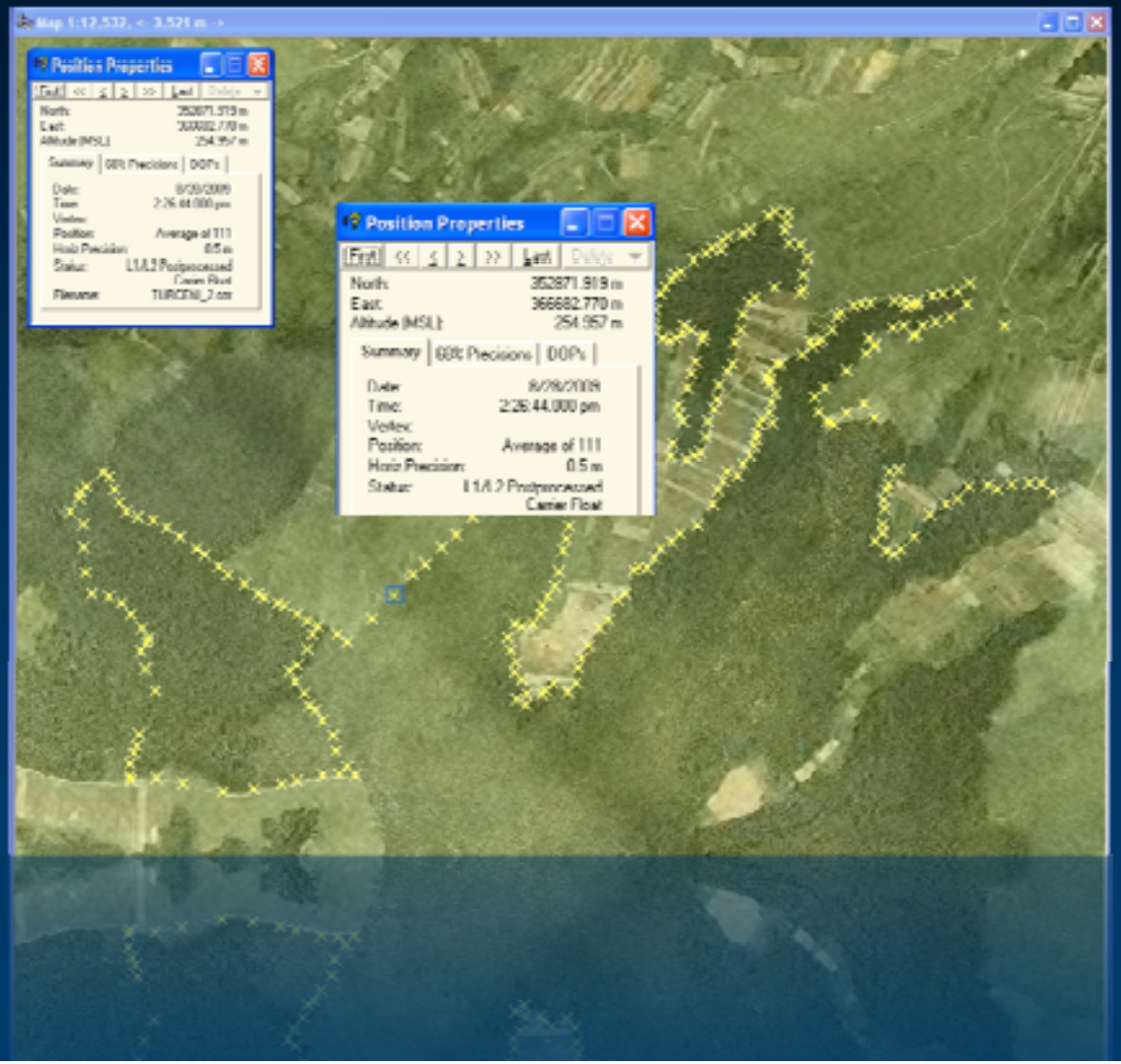
- Using the ProXT / ProXH, the rangers navigated the forestry sites and mapped more than 400ha/per week
- Efficient use of GPS and GIS technology saves time and money while providing a high accuracy database for developing and implementing an Integrated National Register species of flora, fauna and natural habitats



- Legal boundaries were collected with
  - 2.5-3m accuracy under canopy using uncorrected GPS
  - sub meter accuracy after post-processing over 224km baseline for more than 80% of measurements

L1/L2 Post-processed measurements

Maramures Natural Park



Post-processing File Report

Differential Correction Summary:
1 file processed. In this file:
5606 (99.7%) of 5622 selected positions were code corrected by post-processing
5582 (99.3%) of 5622 selected positions were carrier corrected by post-processing
285 (5.2%) of code positions chosen over carrier, as they were of higher quality

Estimated accuracies for 5619 corrected positions are as follows:

Range	Percentage
0-15cm	-
15-30cm	-
30-50cm	0.1%
0.5-1m	80.4%
1-2m	16.2%
2-5m	2.9%
>5m	0.3%

Differential correction complete.

Habitats and species surveying project with GPS mapping

Maramures Natural Park

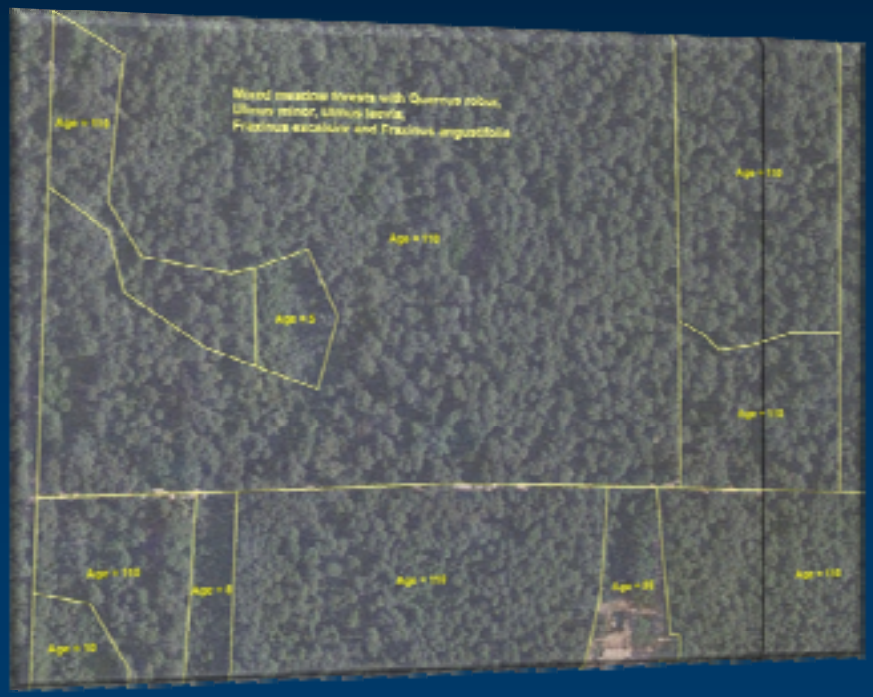
Mapping a Bear Trail

- Juniperus and mountain pine habitats
- Biodiversity hot spots
  - Amphibians, Black grouse, Western capercaille, Roa deer, Red deer, Brown bear
  - sub meter accuracy after post-processing over 224km baseline for more than 80% of measurements

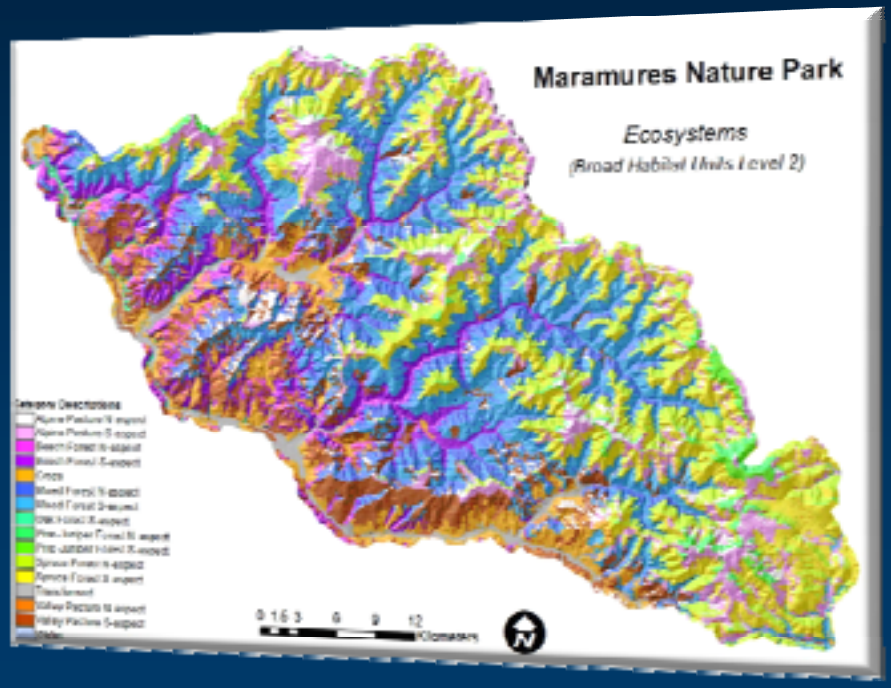
Habitats and species surveying project with GPS mapping

Maramures Natural Park

- Delineation of the natural habitats for Natura2000
- Relevant habitats attributes collected



Mixed meadow forests grouped by age

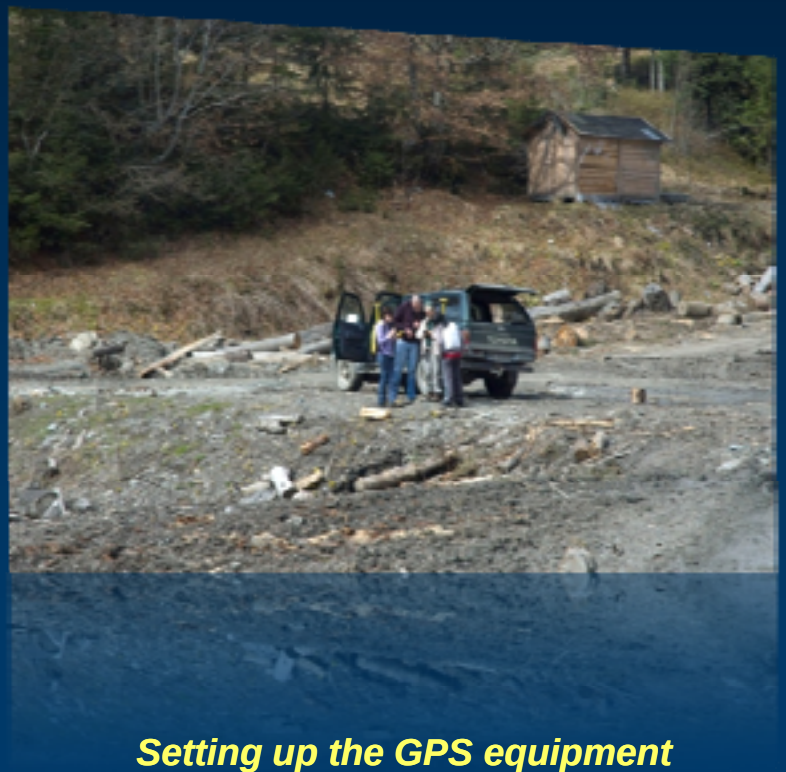


Ecosystems – Maramures Natural Park

GPS mapping

Maramures Natural Park

- **POI's for visitors**
  - Touristic GPS marked trails are published on the Internet
  - Available for download/upload on different GPS units
  - Support for KML format
- **Touristic marked trails and new forestry roads**



Setting up the GPS equipment

Marked trail overlaid on orthophoto

PIATRA CRAIULUI NATIONAL PARK

BUSINESS CASE

General description

Piatra Craiului National Park

- Protected area established in 1990
- Consists mainly of mesozoic limestones and conglomerates
- Located in the mountain climate zone
- Vegetation is distributed in three categories:
  - Mountain, subalpine and alpine
- Rich flora and vegetation – 2001:
  - 1092 vascular plant taxon
  - 52 cenotaxon

Mapping and assessing the main types of habitats

Piatra Craiului National Park

- **Data sources**
  - **Topographic maps**
    - **contour lines, rivers, place geonames, elevation, settlements, park boundary**
  - **Touristic maps**
  - **Forest management plans**
  - **IKONOS satellite imagery**
  - **Orthophoto, 1:5.000 scale**
  - **GPS measurements**
  - **NDVI index calculation**
    - **spectral reflectance analysis for plants**

- **Mapping unit at the habitat level - based on preliminary field observations and other information from an existing literature related to the vegetation in this protected area**

Mapping Units

Piatra Craiului National Park

1. Grohotişuri calcaroase mobile şi semi-mobile cu comunități vegetale din cl. *Thlaspietea rotundifolii*;
2. Versanți stâncoşi calcaroşi cu vegetație casmofitică;
3. Pajişti calcifile subalpine;
4. Tufărişuri de jneapăn (*Pinus mugo*) cu smirdar (*Rhododendron myrtifolium*);
5. Tufărişuri subalpine de smirdar (*Rhododendron myrtifolium)* cu afin (*Vaccinium myrtillus*) şi ienupăr pitic (*Juniperus communis ssp. alpina*);
6. Păduri de molid (*Picea abies*);
7. Păduri de amestec molid (*Picea abies*), fag (*Fagus sylvatica*) şi brad (*Abies alba*);
8. Păduri de molid (*Picea abies*) şi brad (*Abies alba*);
9. Păduri de fag (*Fagus sylvatica*);
10. Tufărişuri de alun (*Corylus avellana*);
11. Păduri de anin alb (*Alnus incana*);
12. Zone locuite;
13. Tufărişuri cu cătină mică (*Myricaria germanica*);
14. Păduri de fag (*Fagus sylvatica*) şi brad (*Abies alba*);
15. Păduri de molid (*Picea abies*) şi pin silvestru (*Pinus sylvestris*);
16. Păduri de pin silvestru (*Pinus sylvestris*);
17. Pajişti cu comunități vegetale din ord. *Arrhenatheretalia,* folosite drept fânețe;
18. Pajişti cu comunități vegetale din al. *Potentillo-Nardion*, folosite drept păşuni;
19. Păduri de larice (*Larix decidua*).

Mapping Units

Piatra Craiului National Park

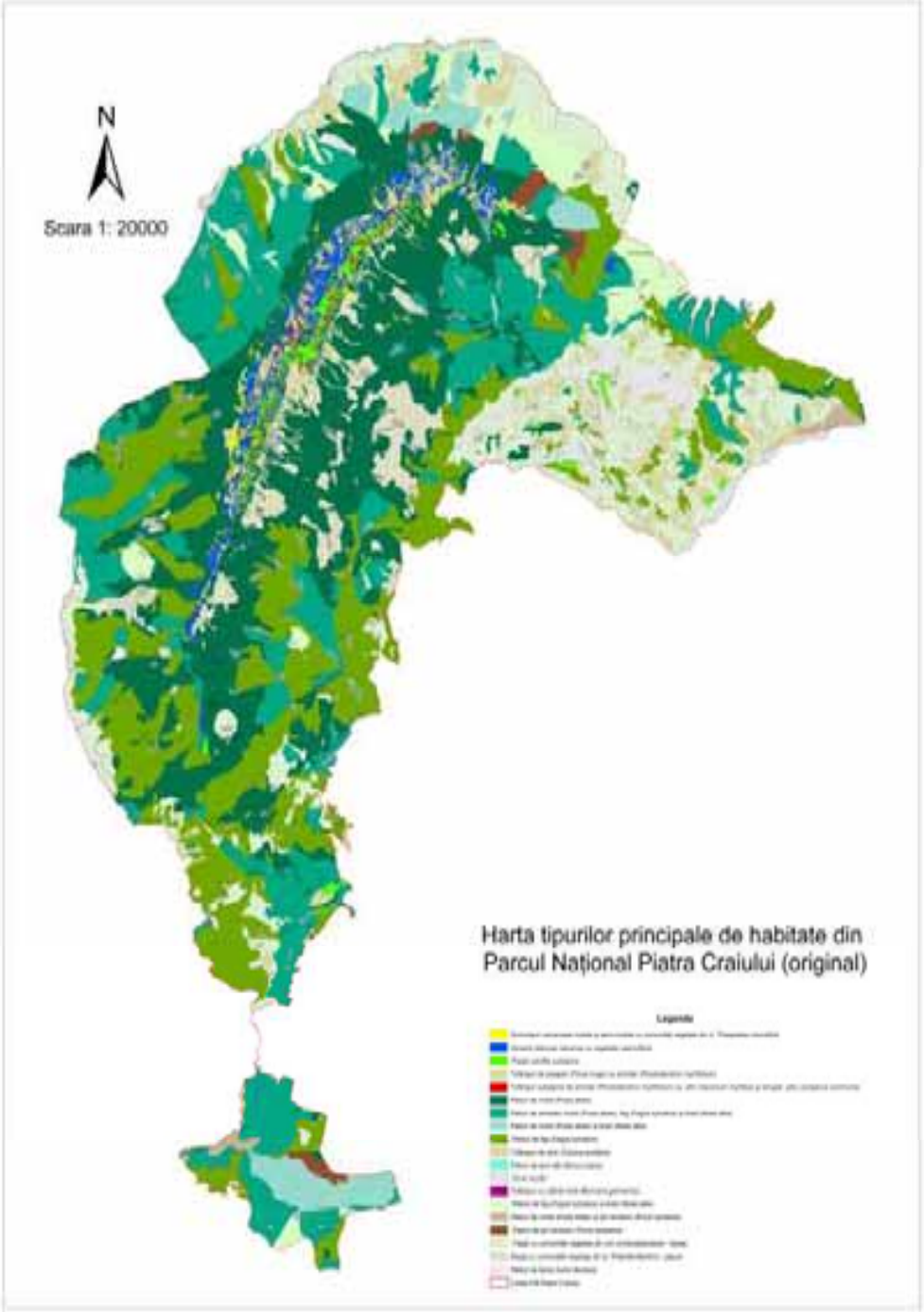
– **Vector data using ArcGIS Desktop**

– **Unique and distinct symbols**

- **each mapping unit**
- **non-standard based**

– **Ridge area was divided into**

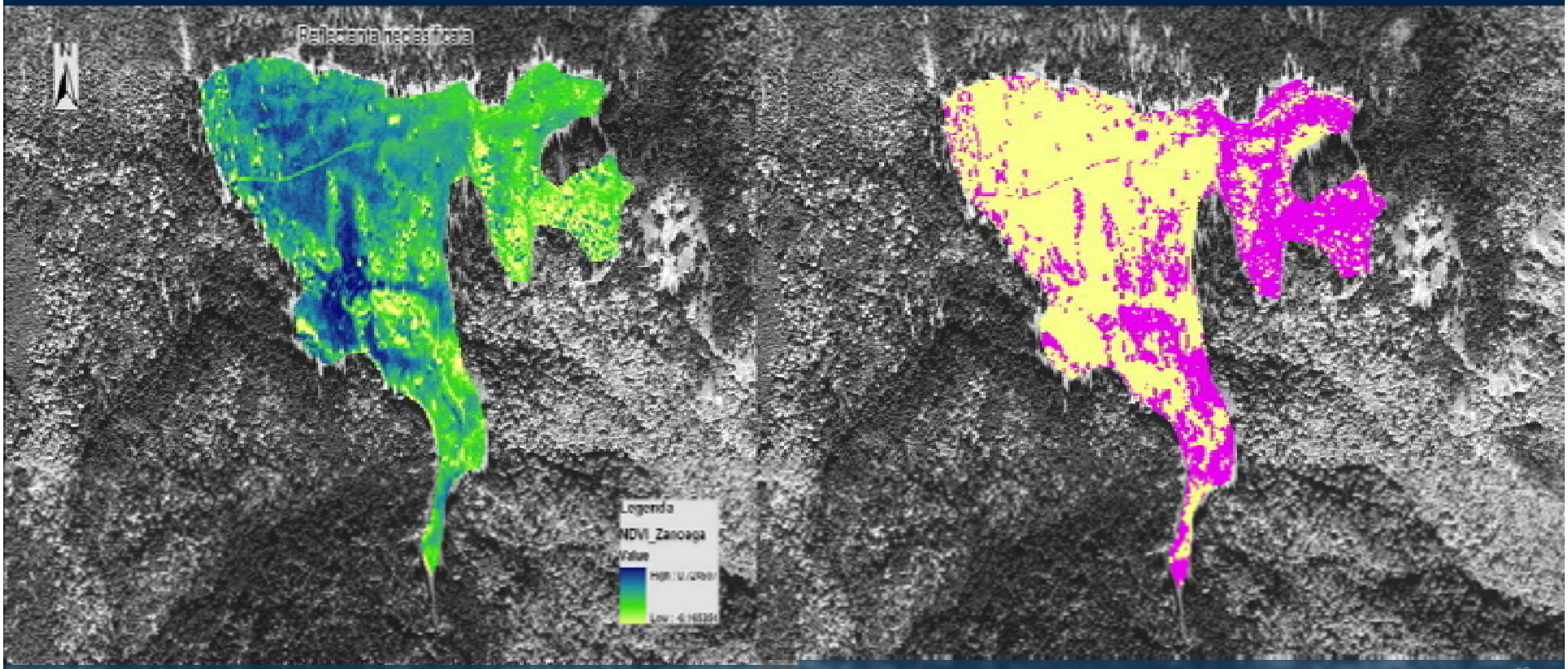
- **several sectors**
- **corresponding to the touristic routes**



Mapping Units

Piatra Craiului National Park

Mapping the degraded phytocoenosis invaded by Nardus stricta – Zanoaga pasture



Main factors and management decisions

Piatra Craiului National Park

– **Main factors affecting biodiversity**
  - current geomorphological processes
  - grazing
  - tourism
  - forestry exploitation developments
  - climate changes

– **Based on several studies and observations they proposed**
  - a series of management measures in order to maintain the habitats and species
  - these measures are included in the Management Plan
  - Improves the conservation status of habitats and species