GIS and GPS technologies to implement Natura 2000 network in Romania
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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 with Recon datalogger and Zephyr Antenna Kit
  - 269 Pathfinder ProXT with 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/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:

<table>
<thead>
<tr>
<th>Range</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>0-15cm</td>
<td>-</td>
</tr>
<tr>
<td>15-30cm</td>
<td>-</td>
</tr>
<tr>
<td>30-50cm</td>
<td>0.1%</td>
</tr>
<tr>
<td>0.5-1m</td>
<td>80.4%</td>
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<tr>
<td>1-2m</td>
<td>16.2%</td>
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<tr>
<td>2-5m</td>
<td>2.9%</td>
</tr>
<tr>
<td>&gt;5m</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Differential correction complete.
Habitats and species surveying project with GPS mapping

Maramures Natural Park

- 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
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
1. Grohotișuri calcaroase mobile și semi-mobile cu comunități vegetale din cl. Thlaspietea rotundifolii;
2. Versanți stâncoși calcaroși cu vegetație casmofitică;
3. Pajiști calcifile subalpine;
4. Tufărișuri de jneapăn (Pinus mugo) cu smirdar (Rhododendron myrtifolium);
5. Tufărișuri subalpine de smirdar (Rhododendron myrtifolium) cu afin (Vaccinium myrtillus) și ienupăr șirap (Juniperus communis ssp. alpina);
6. Păduri de molid (Picea abies);
7. Păduri de amestec molid (Picea abies), fag (Fagus sylvatica) și brad (Abies alba);
8. Păduri de molid (Picea abies) și brad (Abies alba);
9. Păduri de fag (Fagus sylvatica);
10. Tufărișuri de alun (Corylus avellana);
11. Păduri de anin alb (Alnus incana);
12. Zone locuite;
13. Tufărișuri cu cătină mică (Myricaria germanica);
14. Păduri de fag (Fagus sylvatica) și brad (Abies alba);
15. Păduri de molid (Picea abies) și pin silvestru (Pinus sylvestris);
16. Păduri de pin silvestru (Pinus sylvestris);
17. Pajiști cu comunități vegetale din ord. Arrhenatheretalia, folosite drept fânețe;
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