

THE USE OF AERIAL PHOTOS IN DECISION MAKING PROCESSES FOR LANDSCAPE MANAGEMENT

SOIL EROSION GIS DATABASE AT LANDSCAPE LEVEL

Ovidiu IACOBESCU
Ionut BARNOAIEA
The "Stefan cel Mare" University,
Suceava, Romania

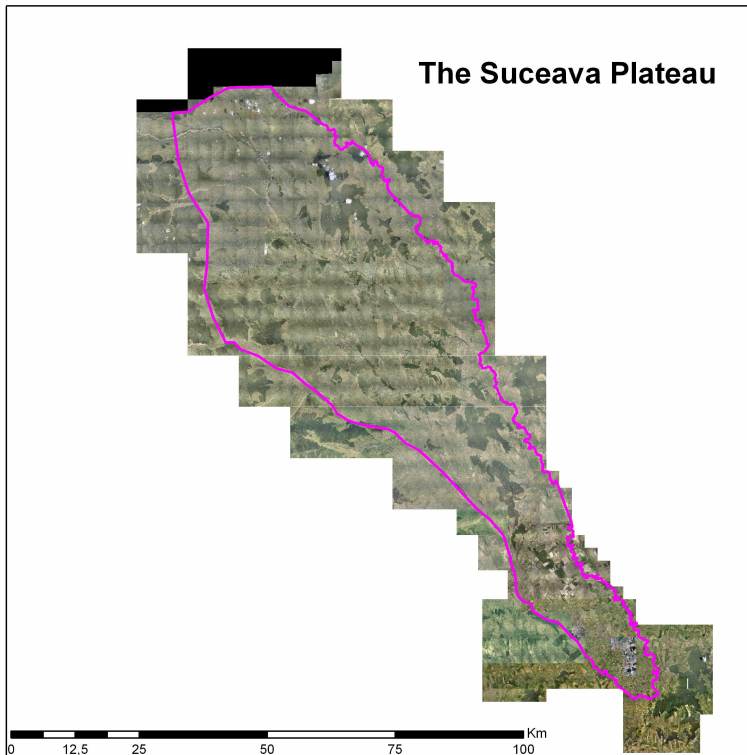
Introduction

- ❑ The geomorphology of Romania leads to favorable conditions for **soil erosion processes**;
- ❑ In 2005, the LPIS European Program offered an excellent mean for its study and mapping – **orthorectified aerial photos** at national level;
- ❑ The research proposes a model for **erosion mapping** within a GIS Database, structured for **ecological rehabilitation purposes**.





Study area

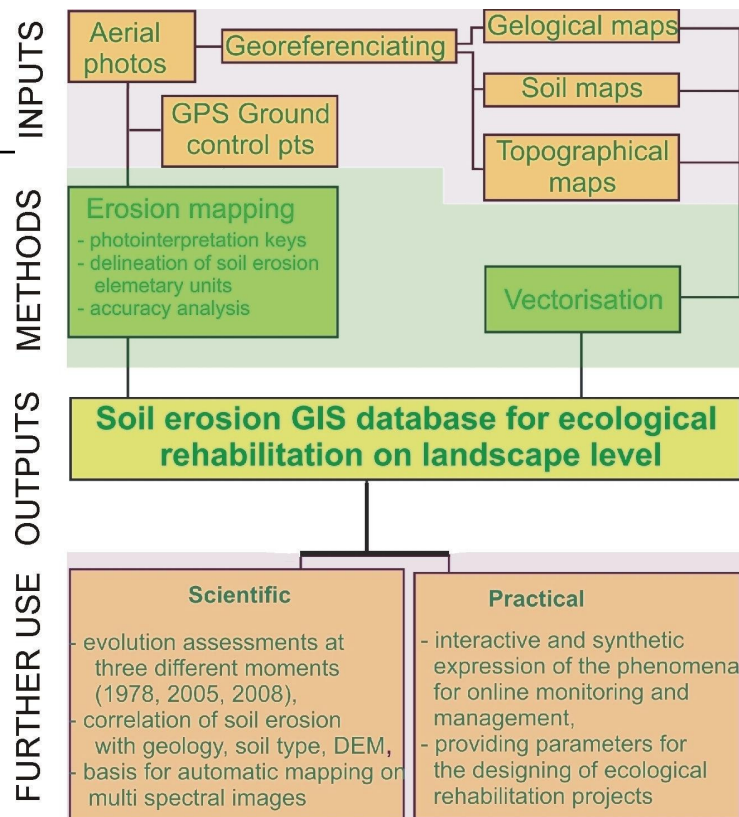


Total area: 3500 km²

Objectives

- *Mapping model* for soil erosion forms with the use of aerial images
- A GIS Database structured for *ecological rehabilitation* purposes
- *Estimation* of soil erosion area within the Suceava Plateau

Workflow design

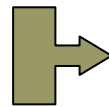


Methods

- Ground inventory for photointerpretation keys
- Erosion units delineation on aerial photos
- Model testing using GPS Ground Control Points
- Integration of geographic data and field information



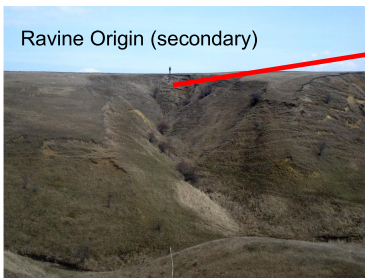
Soil Erosion Mapping Model



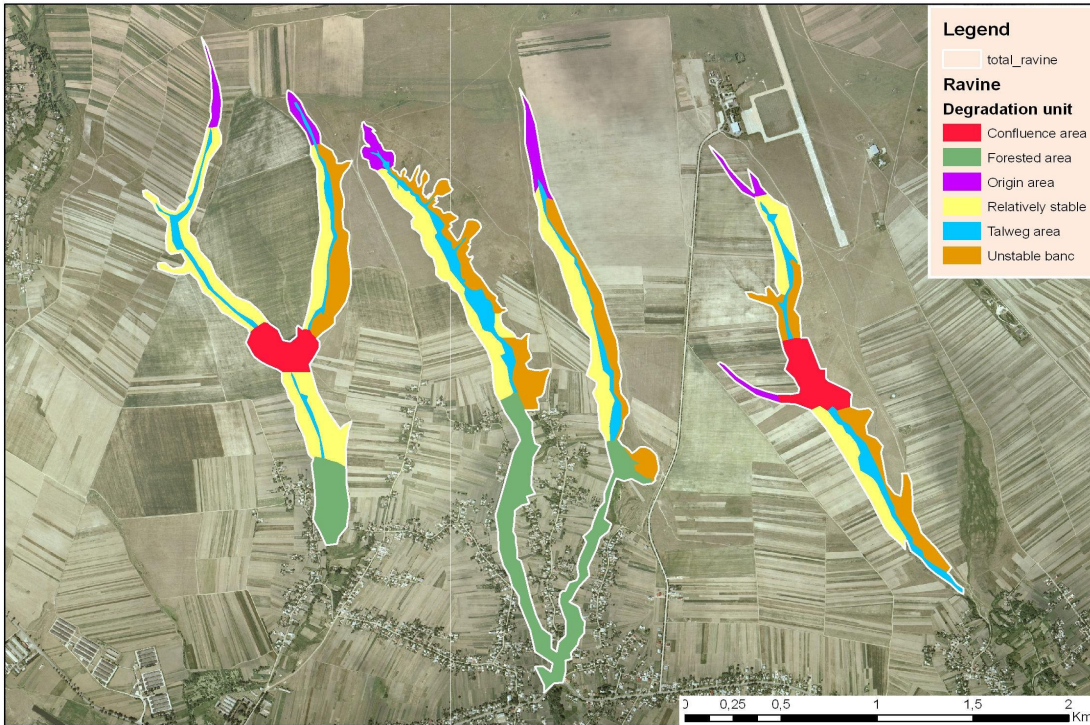
Soil Erosion GIS Database

Ground inventory

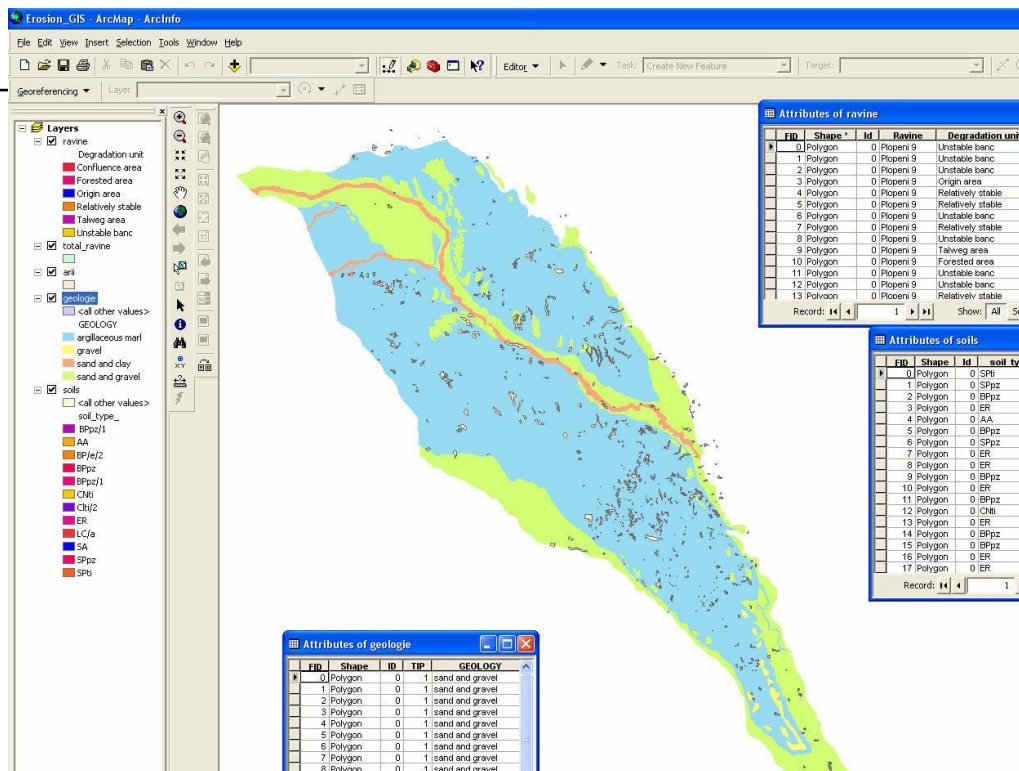
-elementary erosion units



Results: map of elementary erosion units



Results: GIS Database Structure



Results: soil erosion mapping accuracy assessment

- GIS Database offers detailed reports regarding the erosion areas parameters for each administrative unit in the research area;
- The distribution of eroded area by elementary erosion unit types (%):
 - *confluence* – 11
 - *forested* – 9
 - *origin* – 16
 - *relatively stable banks* – 22
 - *unstable banks* – 32
 - *talweg* – 4
 - *sheet erosion* (high intensity) - 6
- The *accuracy assessment* showed insignificant differences between the boundary points measured in the field (GPS) and the delineation done on the orthorectified aerial photos
- The differences (max. $\pm 1.2\text{m}$):
 - due to georeferencing errors,
 - evolution of the phenomenon (2005-2008)
 - are located in the origin area and in unstable banks.

Discussions – model analysis

- | | |
|--|---|
| <ul style="list-style-type: none">□ aerial orthorectified images, with guaranteed precision for erosion mapping technique,□ efficient ground control techniques (handheld GPS, ground photos),□ possible start point for a national up to date inventory of erosion phenomenon | <ul style="list-style-type: none">□ exclusion of forest cover areas from the mapping activities□ static representation of a dynamic phenomena□ difficult to make an accurate characterize areas with incipient <i>sheet erosion</i> |
|--|---|

Discussions – external conditions

- ❑ the need of landscape management analysis in the context of bad practices related to uncertainties in land restitution
- ❑ the need to identify irrational use of agricultural systems
- ❑ increasing up to date data sets (aerial orthorectified images from LPIS European program, different maps)
- ❑ further use basis for *scientific and practical soil erosion analysis*:
 - evolution assessments (1978 - 2008)
 - correlation of soil erosion to geology, soil type and DEM
 - support for *automatic soil erosion mapping* in multispectral images
- ❑ possible low impact on decision making processes due to stakeholders' lack of interest and political instability,
- ❑ old mapping material in different projection systems,
- ❑ image flaws (clouds, shadows, different incidence angle)
- ❑ difficulty in identifying land ownership because of lack of complete cadastral maps

Conclusions

- ❑ The use of aerial photointerpretation in erosion mapping offers efficiency and satisfying accuracy in the analysis of phenomenon at broad scale level
- ❑ The method is able to separate different elementary units of erosion forms, units that require different rehabilitation approaches
- ❑ The results should be analyzed with caution due to the lack of image sensitivity for sheet erosion
- ❑ A soil erosion GIS Database, integrated with geology, soils and topographic information offers the data needed in the ecological rehabilitation design methodology



Thank you!

oiacobescu@yahoo.com

ibarnoaic@usv.ro