Tobak Z. – B. van Leeuwen – Szatmári J.
SZTE TFGT

Légi- és űrtávérzékeléssel támogatott környezeti monitoring

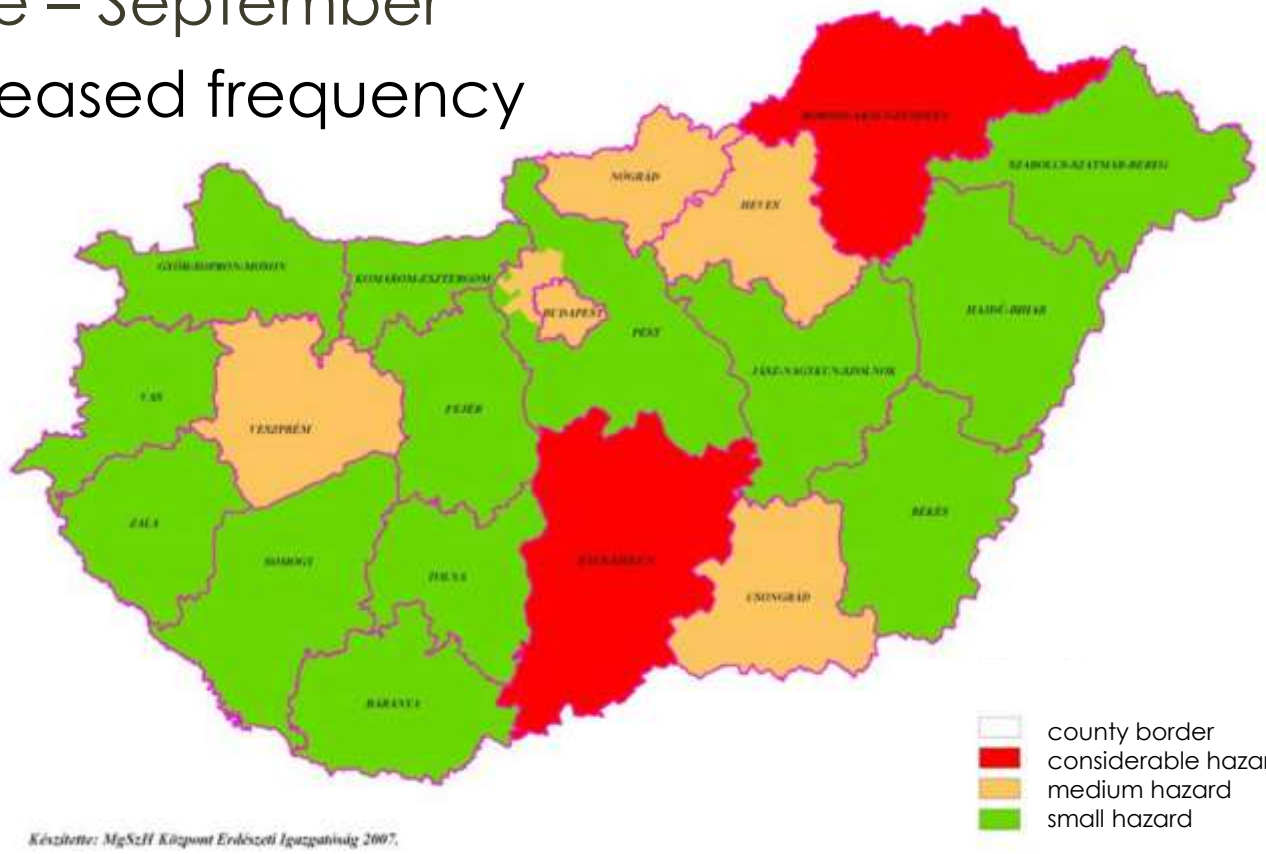
Esettanulmány a leégett bugaci ősborókás területén

TÁMOP-4.2.2.D-15/1/KONV-2015-0010

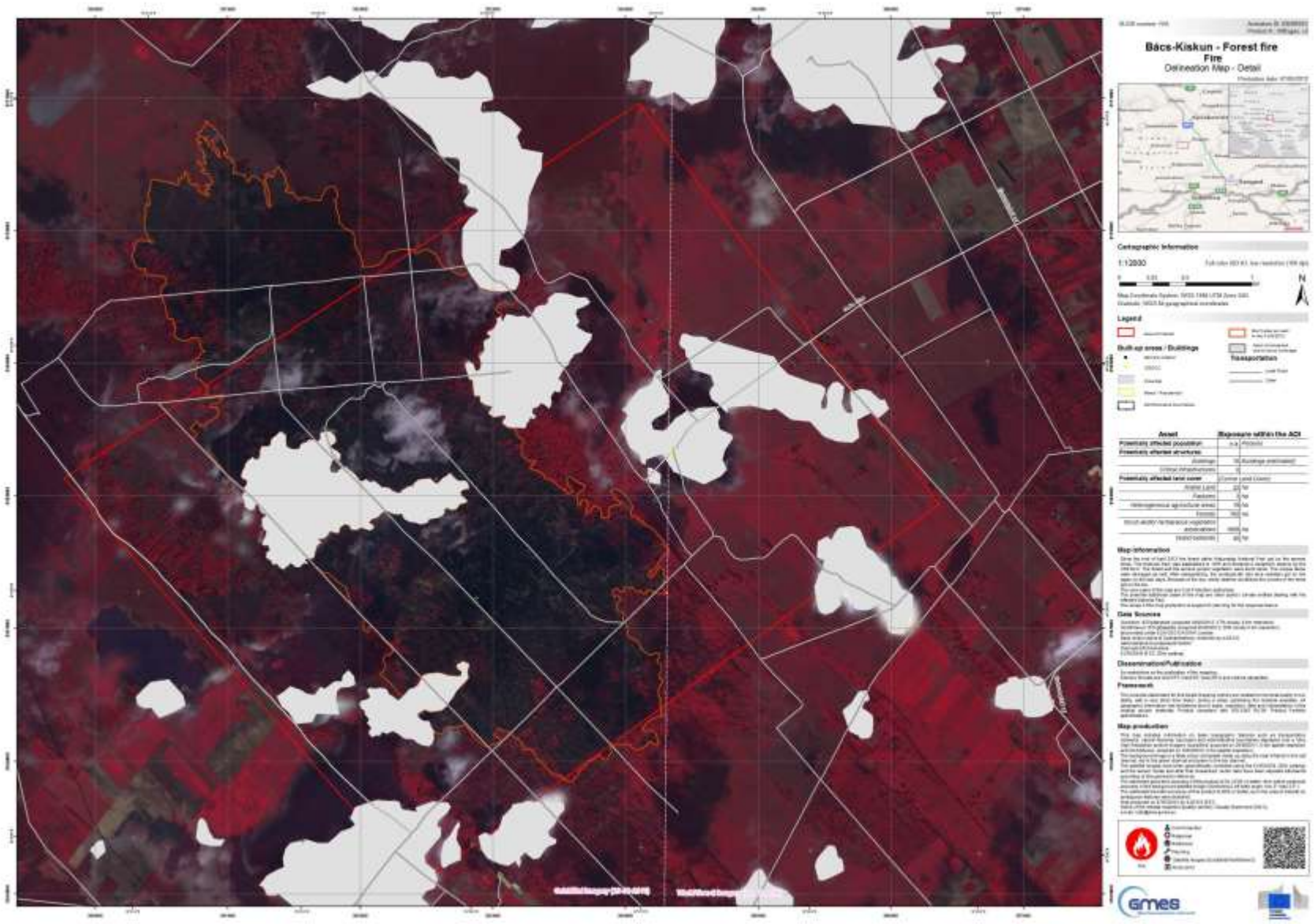
,,Távérzékelési és zöldenergia témájú célzott komplex alapkutatási programok előkészítése, hálózatosodás és felkészülés nemzetközi programokban és kezdeményezésekben való részvételre"c. pályázat

Forest fire in Hungary

- February – April
- June – September
- increased frequency



Wildfire near Bugac



Wildfire near Bugac

Possible consequences

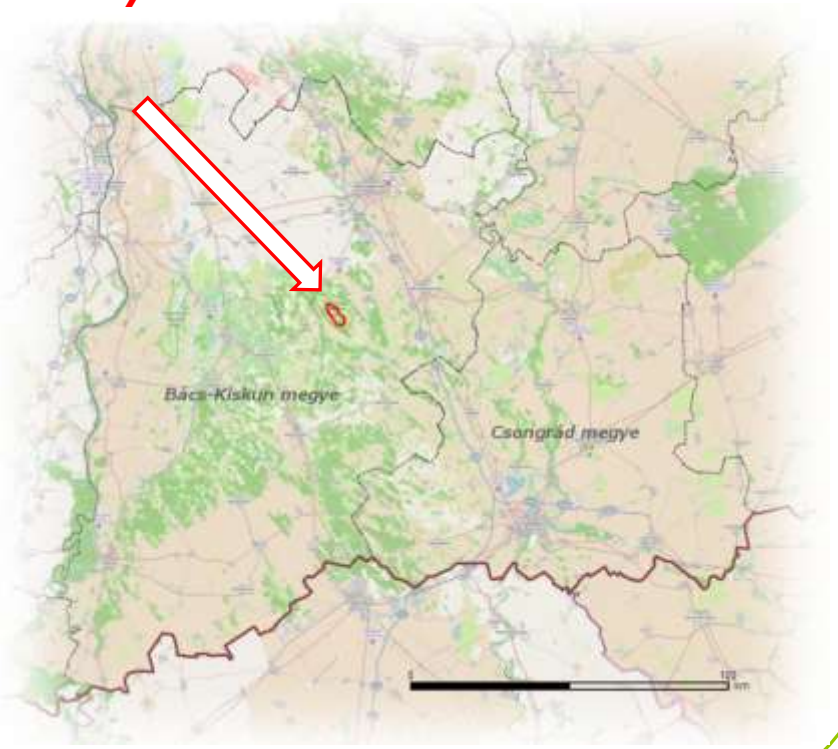
- Fauna – suffering of early nesting birds
- Flora – spreading of invasive species: black locust, common milkweed…
- Regeneration could take decades

Wildfire near Bugac

Facts

- Natura 2000
- 29 April 2012 → 5 M
- 90% of the Juniper affected
- Crown- and underb poplar, locust)
- 17 vehicle, 80 firem helicopter

Study area



Study Area

Open perennial sand grassland

Common junipers

Stipa borysthenica

Wildfire near Bugac

Restoration

- Maintaned by the Kiskunság National Park

→ Estimation of damage and restoration

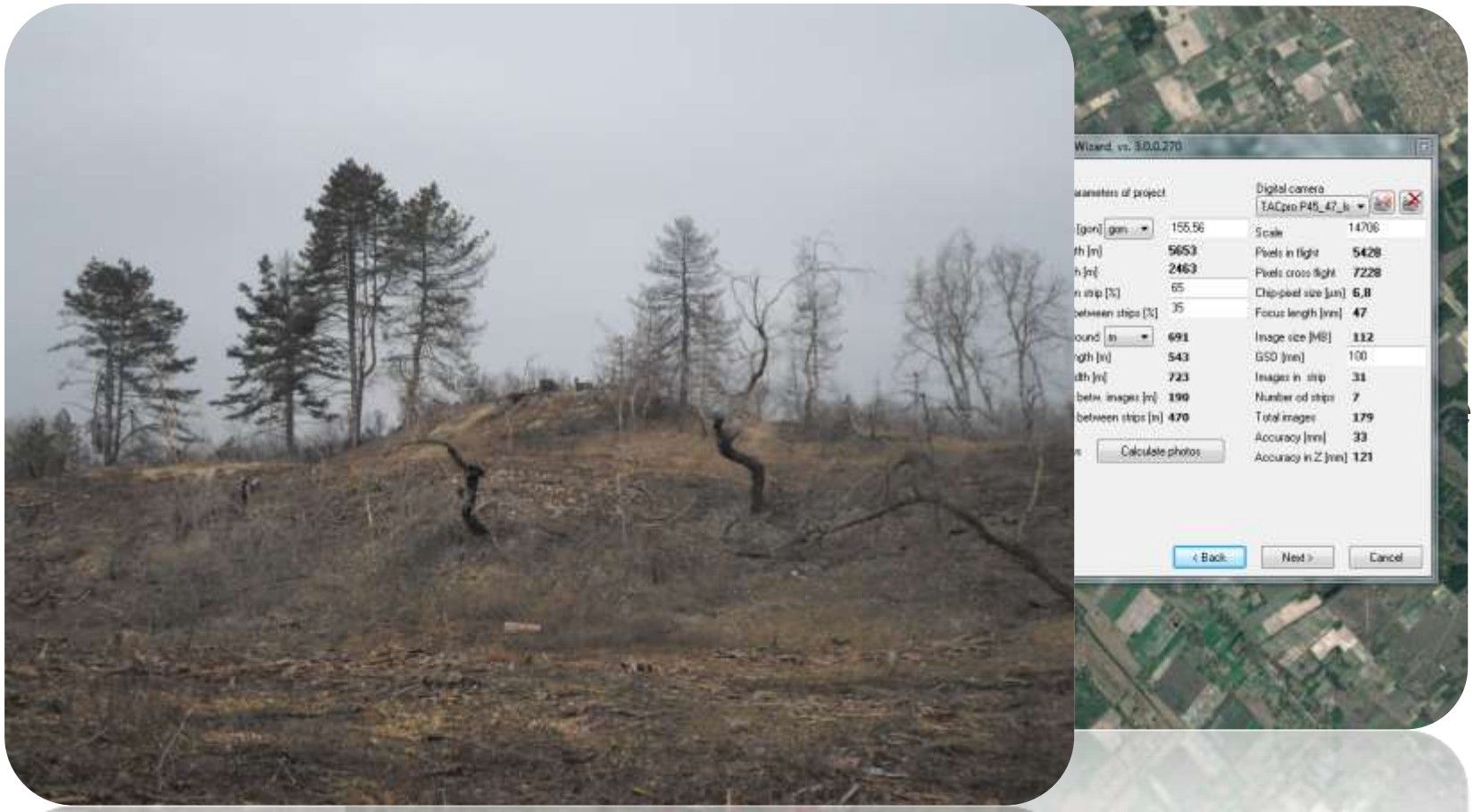
- Field survey – 2012-
- Damage estimation based on aerial photographs 1 month after the fire (7 June 2012)
- Aerial and field monitoring of the regeneration and the spreading of invasive spieces 1 year after the event (1 July 2013)

Goals

- Large scale mapping
- Deliniating the different damage regions
- Area calculations → estimation of restoration costs (KNP)
- Change detection
  - Remote Sensing (2012 / 2013 / 2015)
  - Field Survey (2014 / 2015)

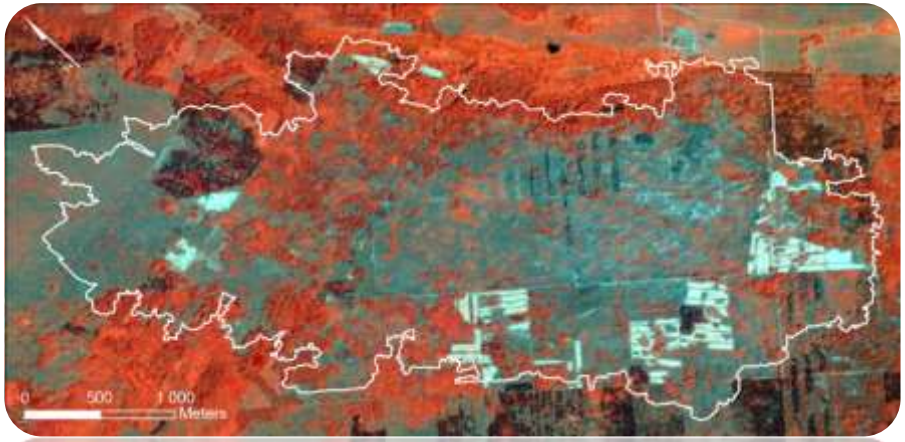
Aerial image acquisition

- Small (or medium) Format Aerial Photography



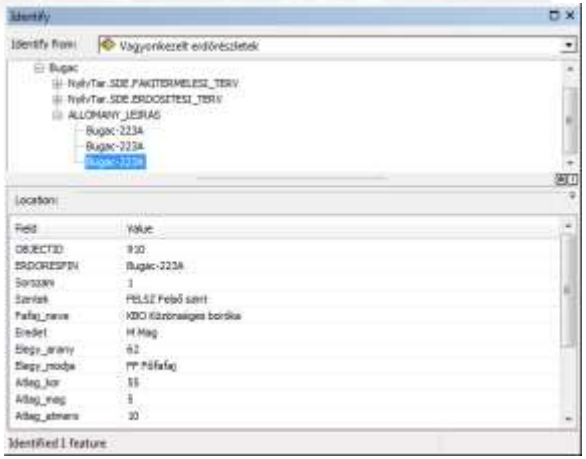
RapidEye satellite imagery

- 22 July 2015
- 5 m / 5 bands



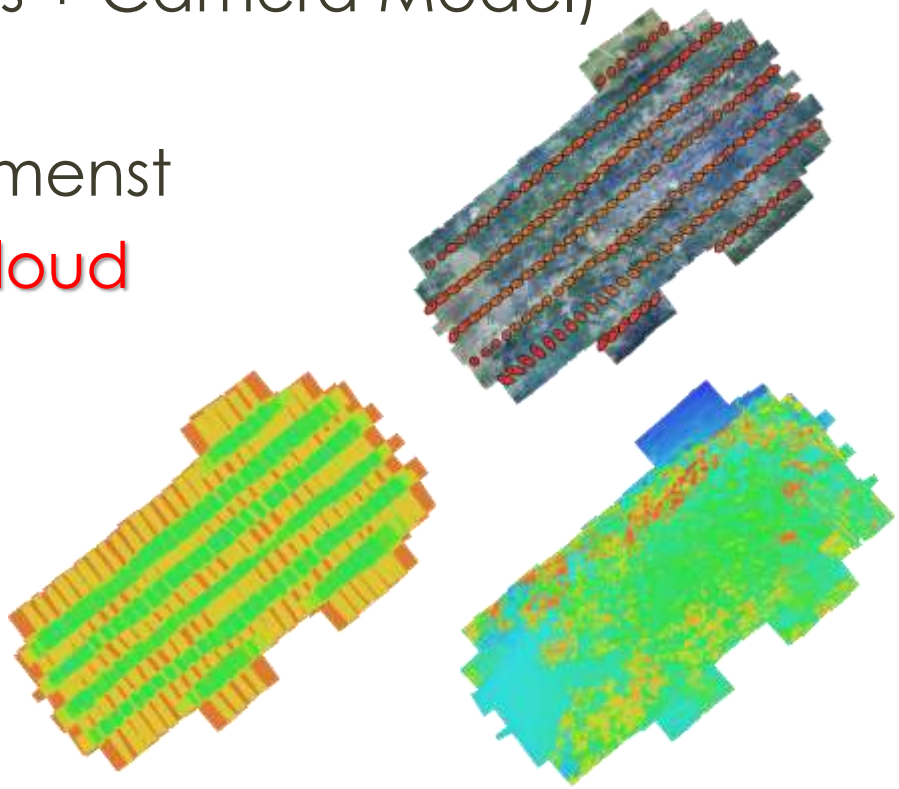
Digital Forestry DB

- Bács-Kiskun Megyei Kormány-hivatal Erdészeti Igazgatóság
- KNP



Agisoft PhotoScan

- (Exterior parameters + Camera Model)
- Align photos
- GPC field measuremenst
- Build dense point cloud
- Build mesh
- (Build texture)
- Export orthophoto



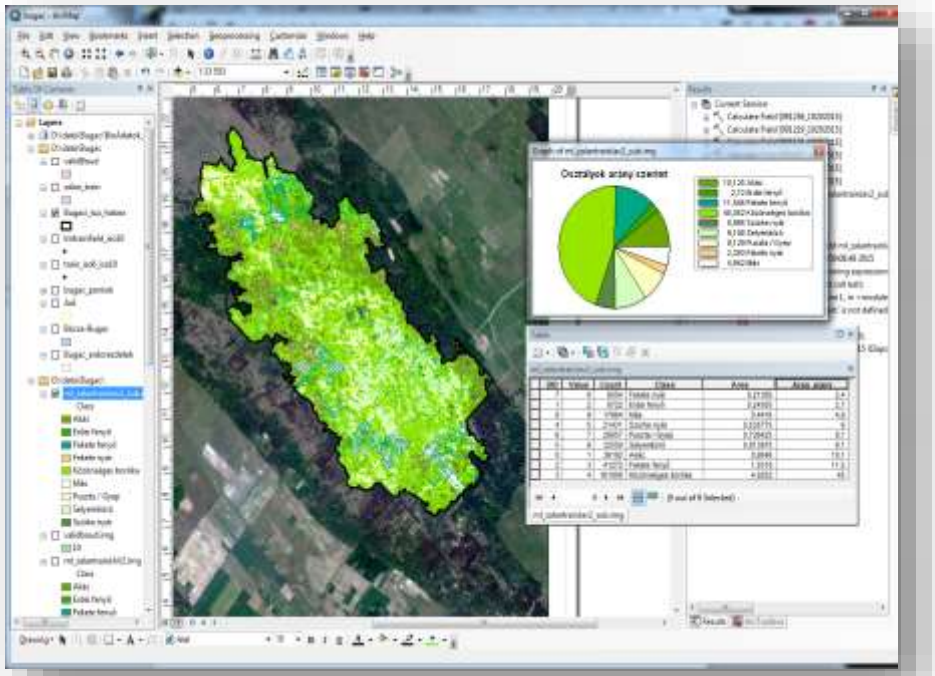
ERDAS / ArcGIS

Aerial
damaged (burnt)
partly damaged
intact

- Training site selection (DB / Field survey / Image)
- ML classification
- arboreal + invasive spieces / veg. condition

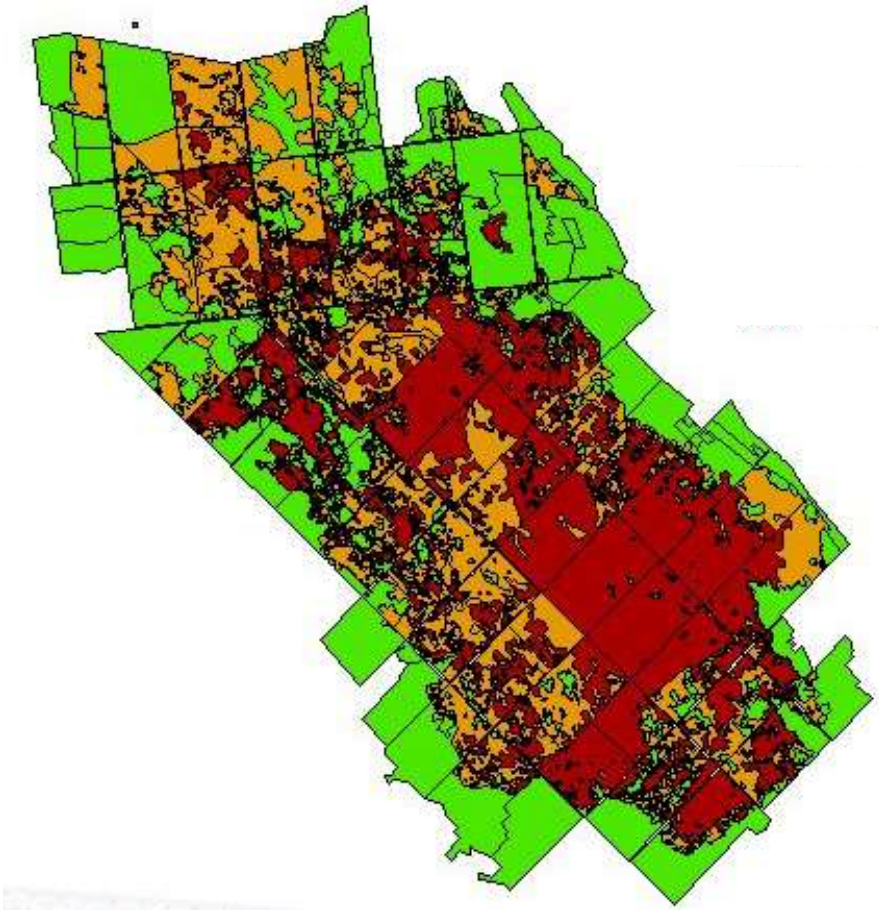
RapidEye

Robinia pseudoacacia
Pinus sylvestris
Pinus nigra
Populus canescens
Populus nigra
Juniperus communis
Asclepias syriaca
+ grassland



Aerial

Manual deliniation



24% intact

38% partly damaged

38% demaged

Requires familiarity with the study area

Unsupervised (ISODATA) classification

Aerial

- without apriori information
- subsequently labeling of classes:

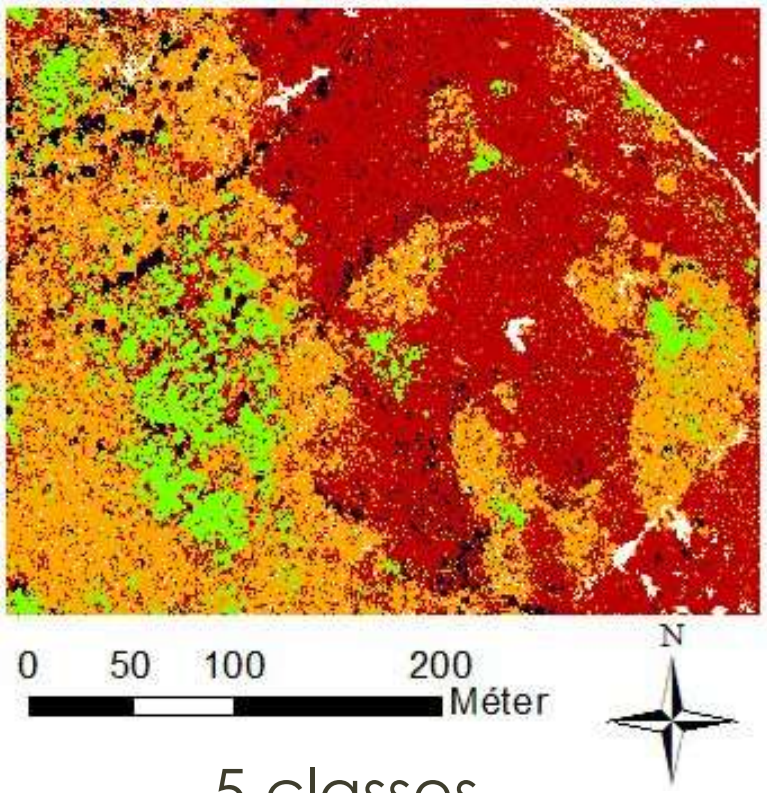
intact or partly damaged

damaged (burnt)

shadow, sand

→ Training set for classes →

Supervised classification



damaged (burnt)

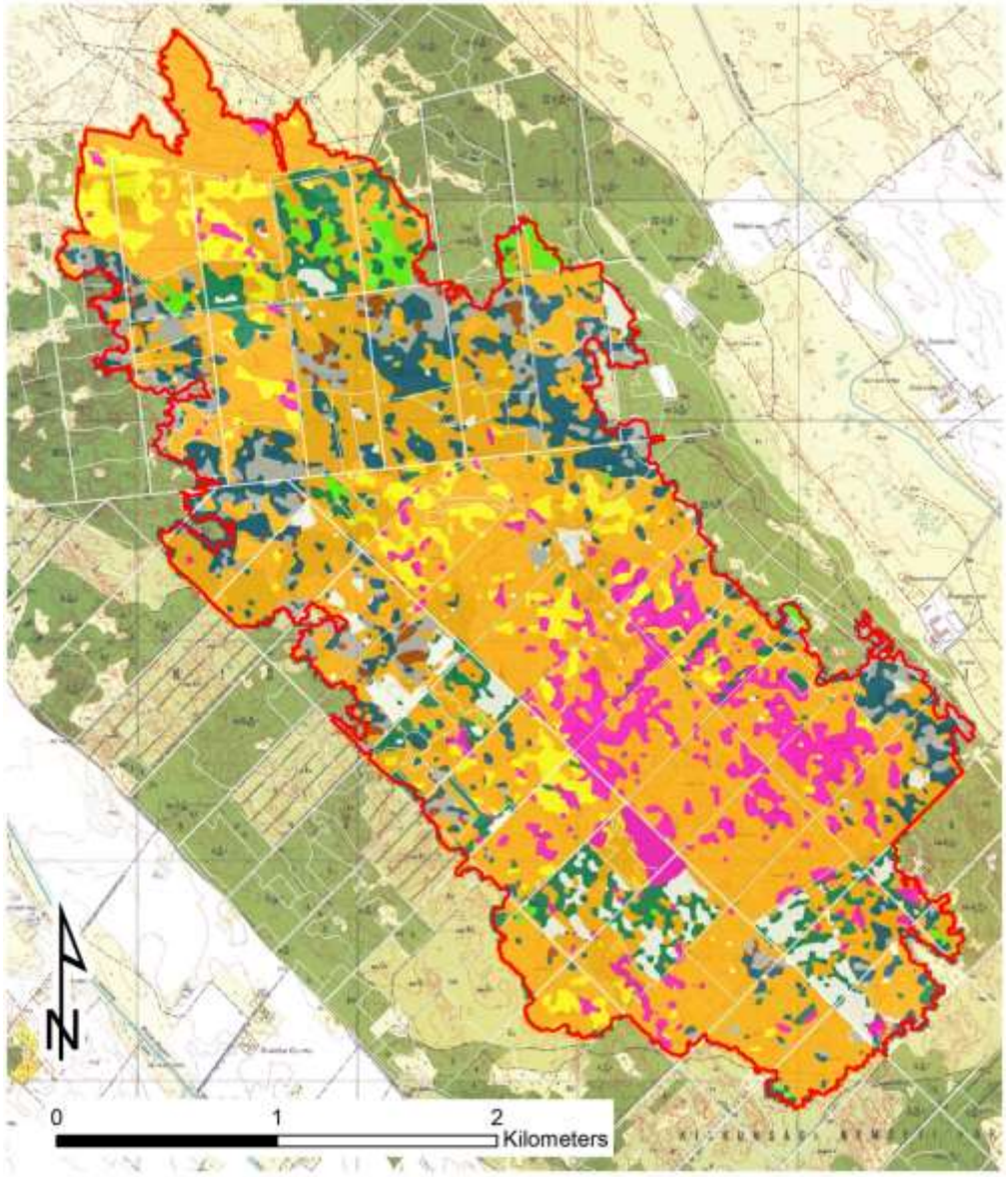
partly damaged

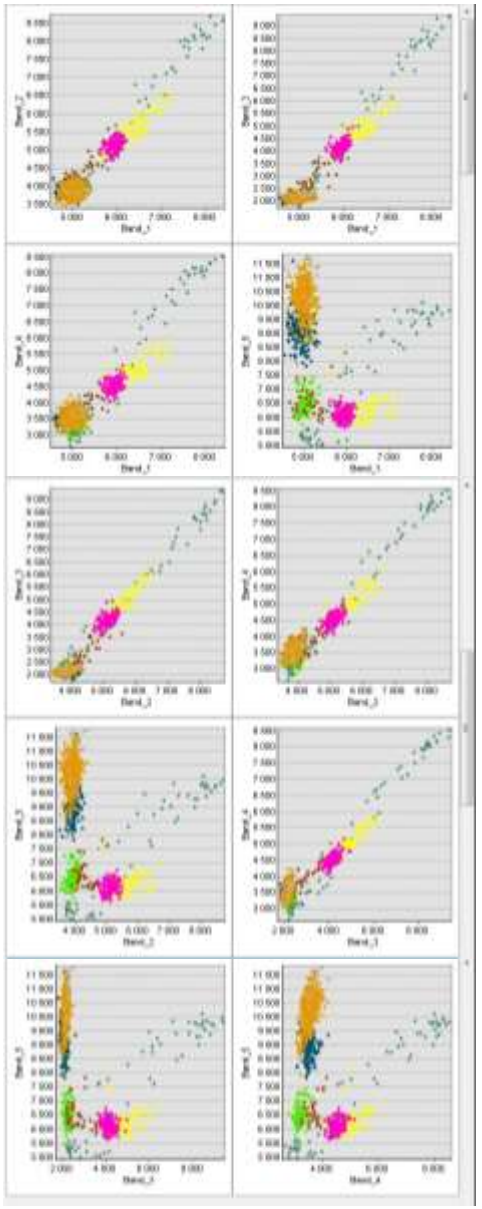
intact

shadow, sand

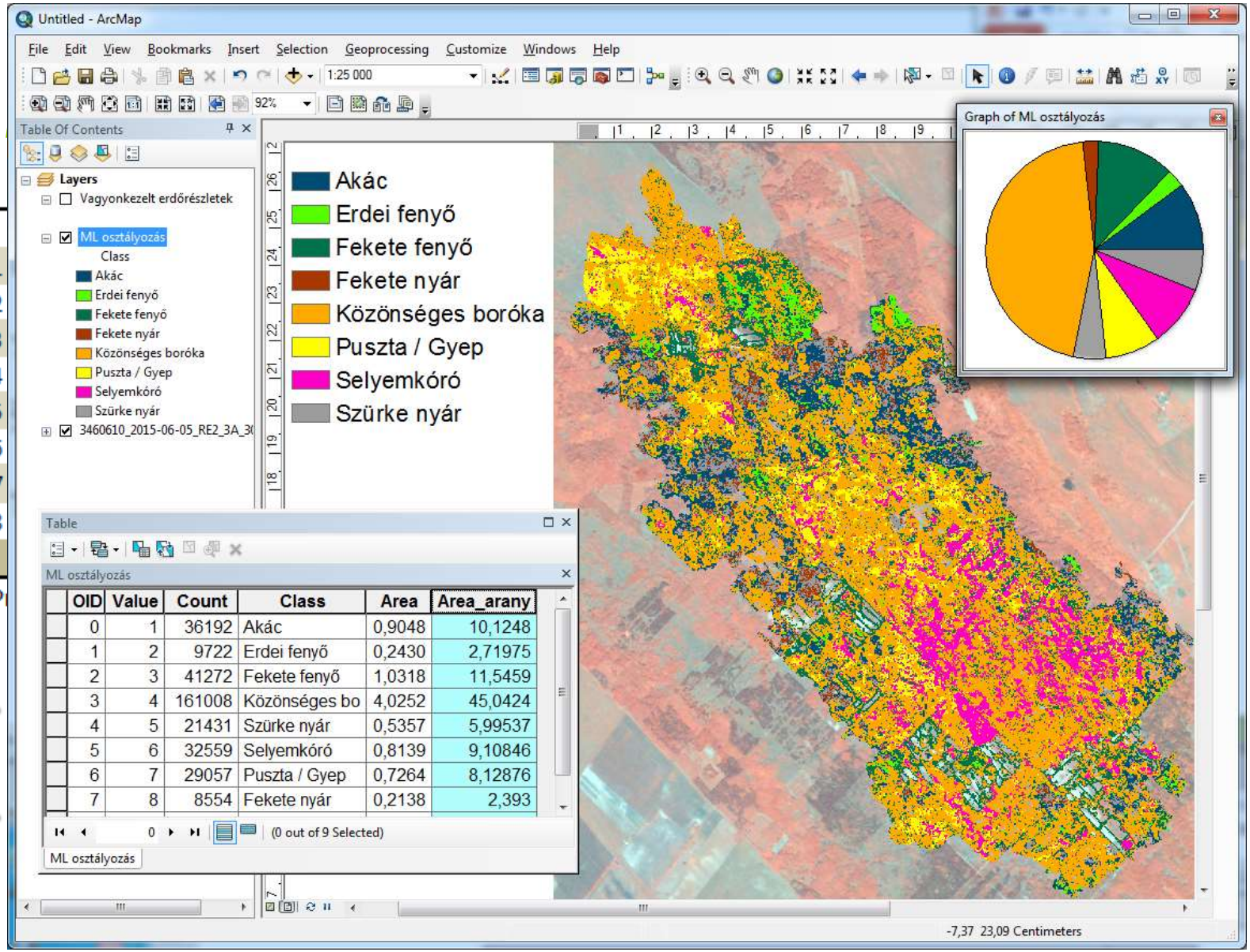
5 classes

Results



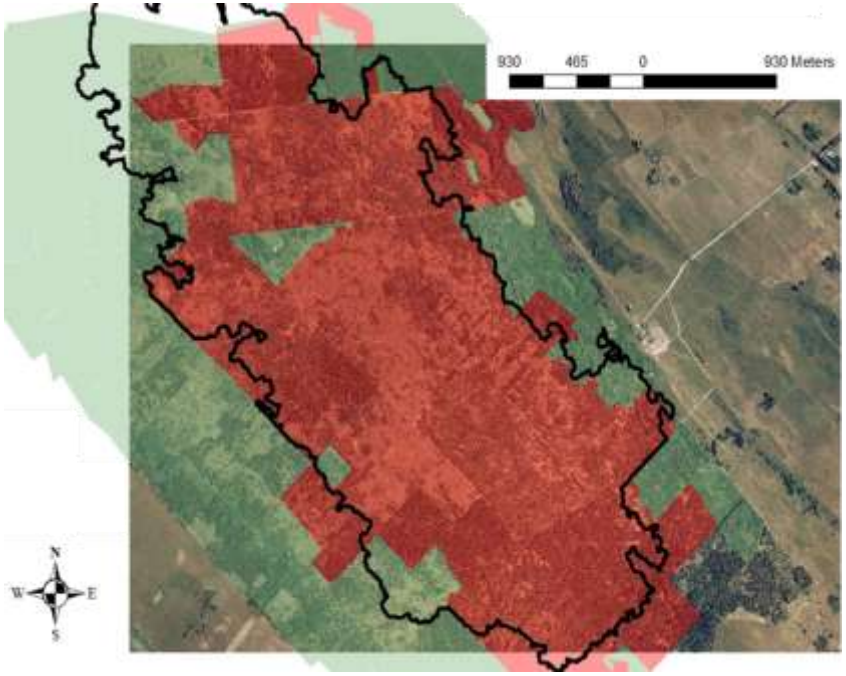


Results


Untitled - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
Table Of Contents
Layers
Vagyonkezelt erdőrészletek
ML osztályozás
Class
Akác
Erdei fenyő
Fekete fenyő
Fekete nyár
Közönséges boróka
Puszta / Gyep
Selyemkóró
Szürke nyár
Graph of ML osztályozás
Table
ML osztályozás
OID Value Count Class Area Area_arany
0 1 36192 Akác 0,9048 10,1248
1 2 9722 Erdei fenyő 0,2430 2,71975
2 3 41272 Fekete fenyő 1,0318 11,5459
3 4 161008 Közönséges bo 4,0252 45,0424
4 5 21431 Szürke nyár 0,5357 5,99537
5 6 32559 Selyemkóró 0,8139 9,10846
6 7 29057 Puszta / Gyep 0,7264 8,12876
7 8 8554 Fekete nyár 0,2138 2,393
(0 out of 9 Selected)
-7,37 23,09 Centimeters
Classification Res.
RapidEye

→ Digital forest map →

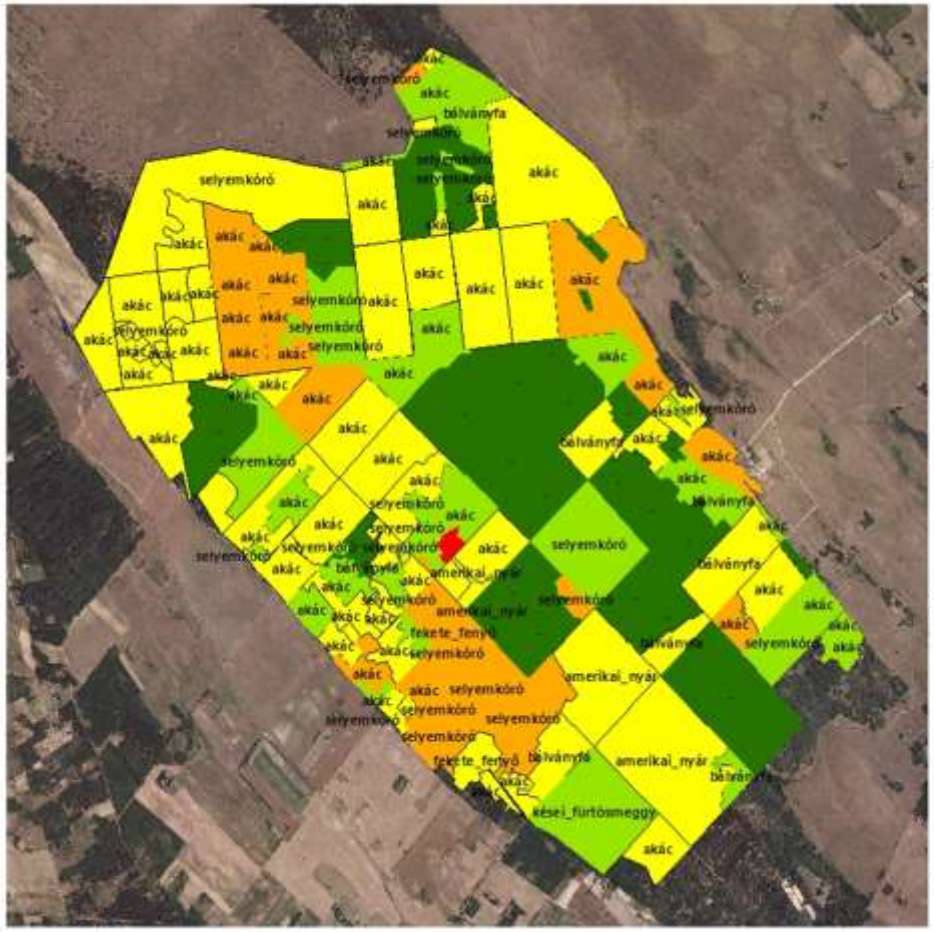
Vegetation



- black locust (4%)
- junipers (6%)
- Scots pine (17%)
- white/grey poplars (35%)
- white/grey poplar-junipers (28%)
- open grasslands (10%)

→ Digital forest map→

Invasive species



46% - black locust

18% - common milkweed

8% - ailanthus

28% - other or non-native species

N
W
E
S

Degree of invasion (2014)

1
2
3
4
5

+ american aspen, black pine, wild black cherry

1. no invasion
2. 0-10% invasion
3. 10-25% invasion
4. 25-50% invasion
5. over 50% invasion

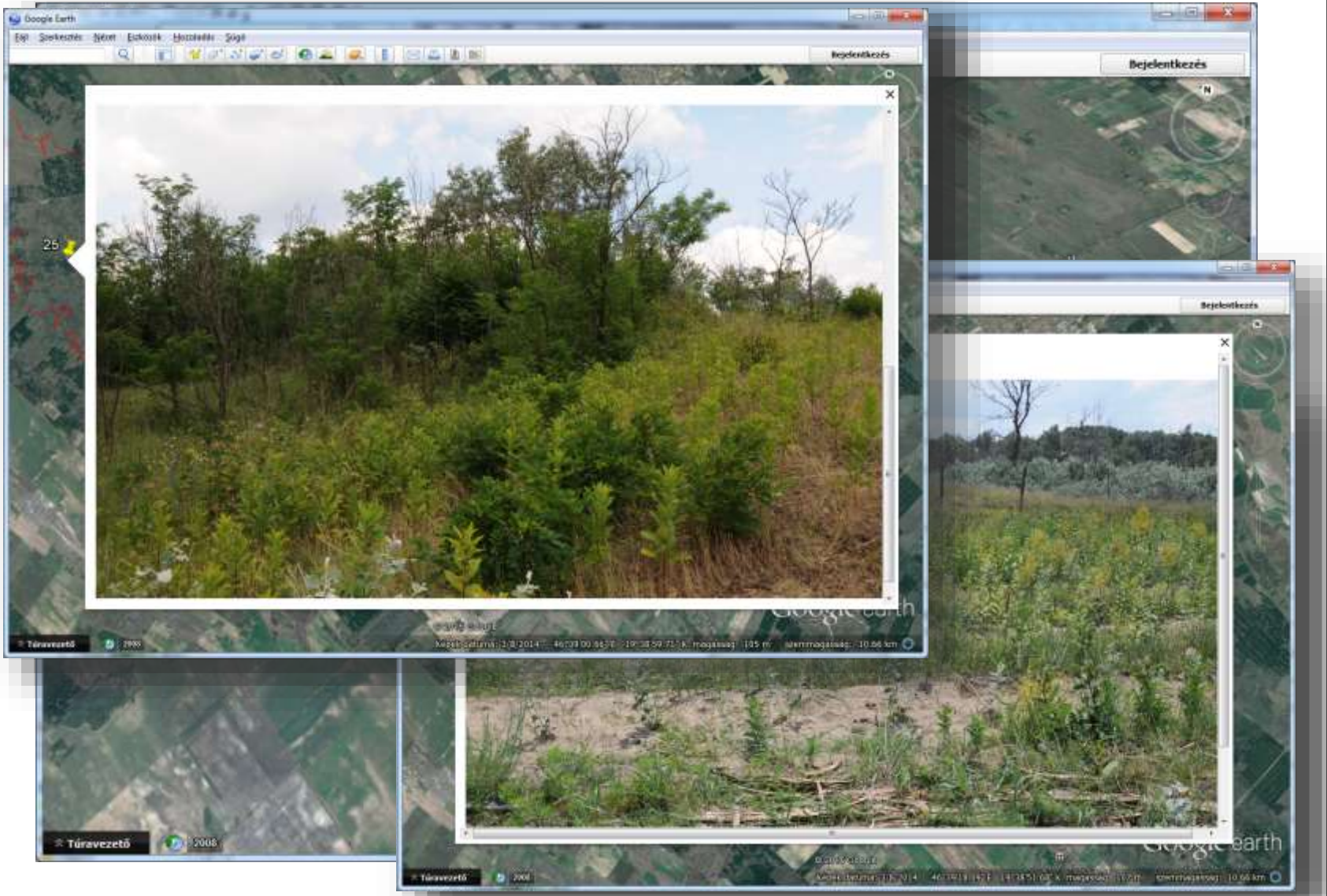
830 415 0 830 Meters

Vegetation

False acacia or black locust (*Robinia pseudoacacia*), Common milkweed or silkweed (*Asclepias syriaca*

False acacia
Herbicide injection

Vegetation



Future

- RapidEye (5 bands, 5 m) / RGB+CIR
- Hyperspectral (aerial) images
- Further on site field survey - monitoring

Conclusions

- Extent of damage, type and state of vegetation, extent of the invasive species' appearance were all categorised
- Analyses, geoinformatic database help professionals regenerate the forest
- Regular monitoring (RS/FS)

Thank you for your attention!