Joint Workshop of the GOFC-GOLD SCERIN and MedRIN Networks
CIHEAM conference center, Chania, Greece, July 16 – July 19, 2024
Land Cover Change (LCC) and Extreme Events in the Context of Climate Change
Mediterranean Agronomic Institute of Chania
Region of Crete
Eratosthenes Center of Excellence, Cyprus University of Technology
Aristotle University of Thessaloniki
NASA LCLUC Program
GOFC-GOLD and START, USA

Remote sensing based susainable forest management in Vojvodina Province, Serbia

Bojan Tubić, PhD

Forest ecosystems

Serbia (without KiM) – 29,1 %

AP Vojvodina – 7,1%

Central Serbia – 37,6%

Optimal: 40% & 14%?

Project: “Contribution of Sustainable Forest Management to a Low Emission and Resilient Development” Project (GCP/SRB/002/GFF)“

ПРАВИЛНИК
О САДРЖИНИ, НАЧИНУ УПРАВЉАЊА, ОДРЖАВАЊА И КОРИШЋЕЊА
ИНФОРМАЦИОНОГ СИСТЕМА У ШУМАРСТВУ

(Објављено у „Службеном гласнику РС”, број 49/21

Server Icon

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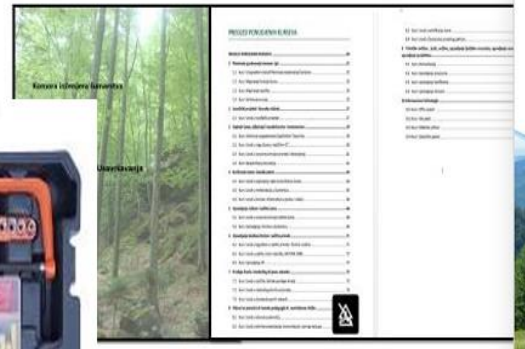
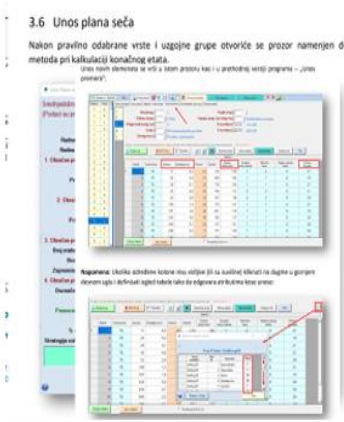
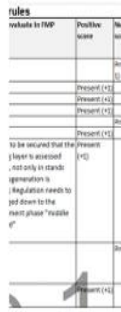
- Program of continuous education with course catalogue
- Regular courses for getting and maintaining license
- Over 40 annual courses with app. 700 forest engineers participating for holding license
- Over 7 courses with app 90 forest workers for safe and efficient work in forest



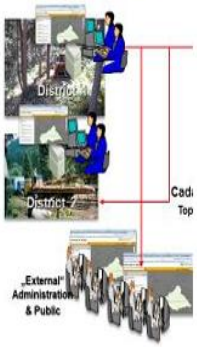
Demonstration plots

Natural value assesment and software solution

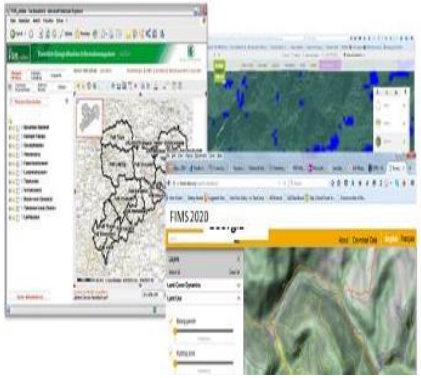




User interface of a modern FIMS



• Webportal (Web-GIS) to access and retrieve data



Guidelines for forest management

Improved Methodology And Land Cover Analysis

Second NFI			
FORESTS **AP Vojvodina (ha)**	%	FORESTS Total RS	%
175.304,82	8,1 (7,8)	3.049.502,10	39,3 (34,2)

Forest cover of Vojvodina Province

- FMP for Vojvodina (all FMU)
  - 140.380 ha forest cover (6,5%)
- Cadastre - total 144.841 ha forest and forest land (6,7% površine)
- NFI – Faculty of Forestry - 154.000 ha forest cover (7,1% of total area APV)
- NFI II – Faculty of Forestry- 175.304,82 ha forest cover (8,1% (7,8%) of total area APV)

- Dr Slavko Vlatković (PhD thesis, 1981)
  - 137.094 ha forest (6,37%)

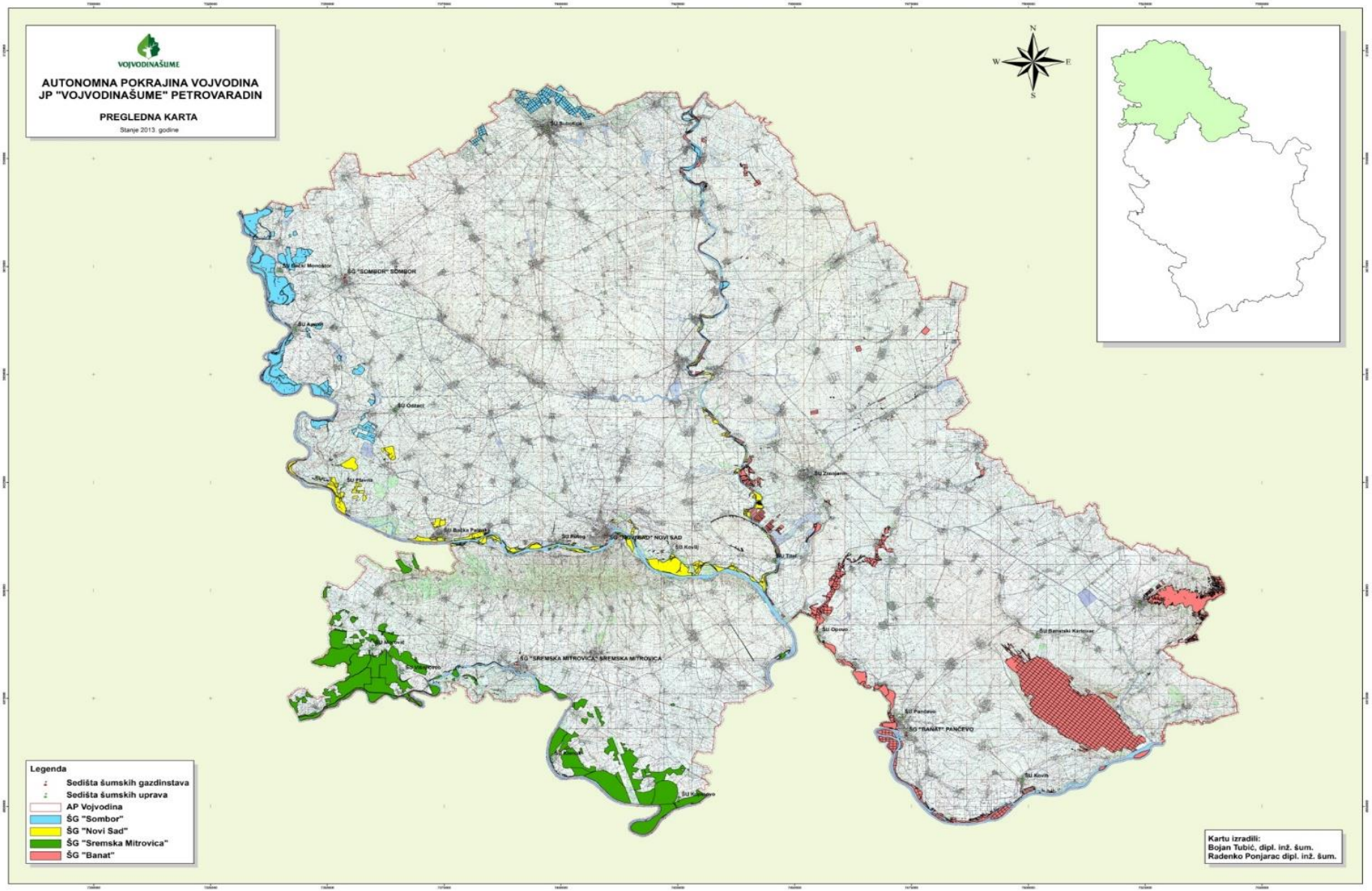
Improved Methodology And Land Cover Analysis

Land use vs Land cover

FOREST RESOURCES ASSESSMENT (FRA) adopts a common definition of "forest" to monitor global forest area based on biophysical and land use criteria.

GLOBAL FOREST WATCH (GFW) monitors all forms of tree cover to detect loss and gain based on biophysical criteria, and uses the term "tree cover" instead of "forest".

Forest cover of Vojvodina Province



Forest ecosystems

Municipality	Area (ha)		%
	Ukupno	Forest	
Sombor	117.722	6.694	5,7%
Apatin	34.957	5.819	16,6%
Kula	48.146	154	0,3%
Odžaci	41.116	1.922	4,7%
Zapadno-bački district	**241.942**	**14.589**	**6,0%**
Subotica	100.738	3.738	3,7%
Bačka Topola	59.586	389	0,7%
Mali Iđoš	18.116	26	0,1%
Severno-bački district	**178.441**	**4.153**	**2,3%**
Šid	68.703	21.113	30,7%
Sremska Mitrovica	76.157	11.030	14,5%
Irig	23.028	4.258	18,5%
Ruma	58.206	8.229	14,1%
Inđija	38.459	1.310	3,4%
Stara Pazova	35.109	193	0,5%
Pećinci	48.865	9.260	19,0%
Sremski district	**348.528**	**55.393**	**15,9%**

Municipality	Area (ha)		%
	Total	Forest	
Bač	36.479	4.692	12,9%
Bačka Palanka	57.865	4.387	7,6%
Bački Petrovac	15.846	168	1,1%
Vrbas	37.563	159	0,4%
Srbobran	28.430	9	0,0%
Bečej	48.650	458	0,9%
Temerin	16.962	2	0,0%
Žabalj	39.969	605	1,5%
Novi Sad	60.990	3.641	6,0%
Titel	26.220	1.587	6,1%
Beočin	18.458	6.977	37,8%
Petrovaradin	8.925	2.967	33,2%
Sremski Karlovci	5.054	1.603	31,7%
Južno-bački district	**401.411**	**27.255**	**6,8%**

General data / PE „Vojvodinašume“

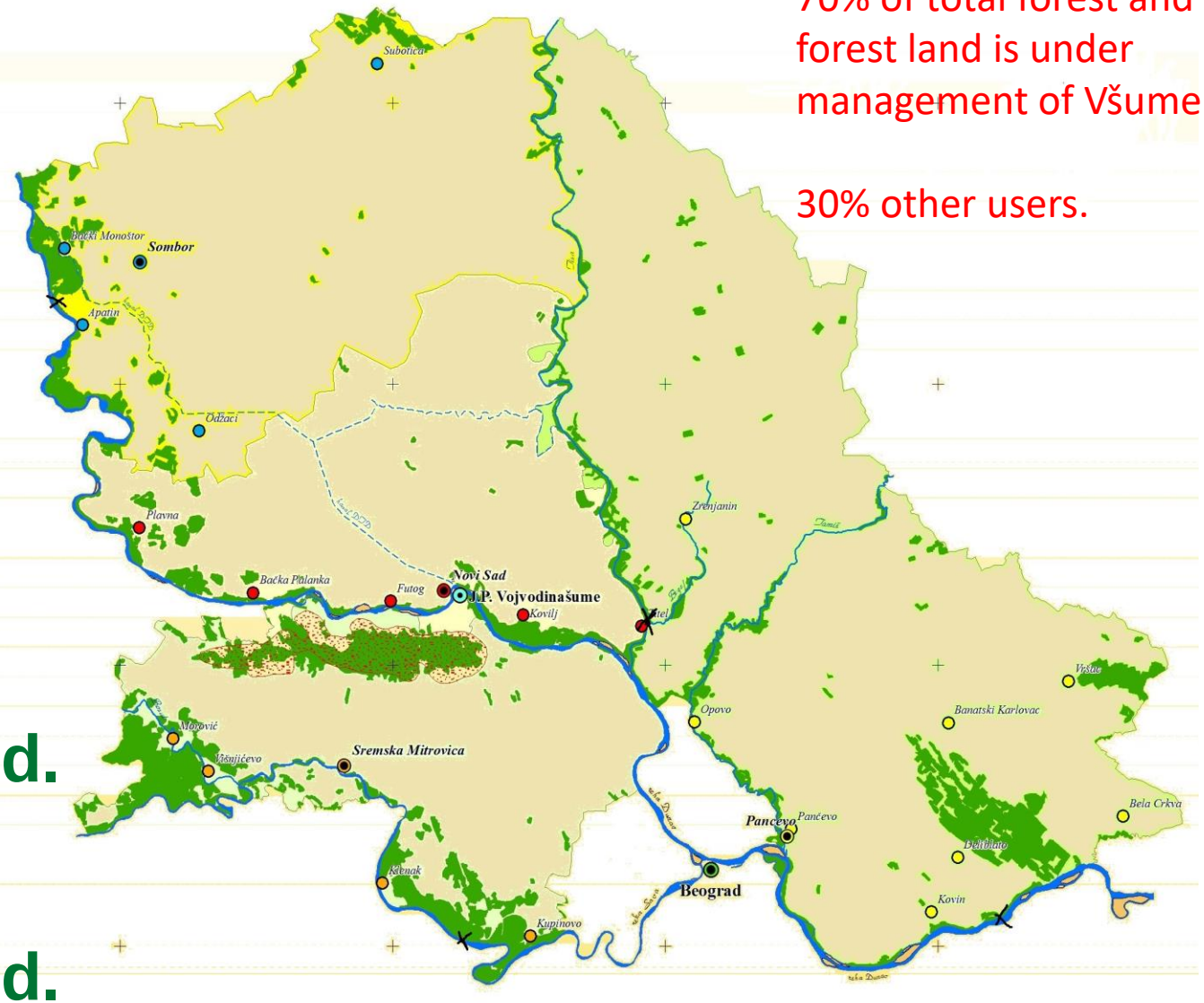
Total area:
130.267 ha

Forest and forest land:
107.013 ha

Wood volume:
23.680.040 m³

Etat (FMP):
715.720 m³/god.

Annual plan:
550.000 m³/god.



70% of total forest and forest land is under management of Všume.

30% other users.

3 years old

Strategic goals/ APV

- **Preserve existing forests**
  - **Climate change effects and natural hazards**
  - **Urban sprawl**
  - **Agriculture**
- **Increase forest coverage** **7 %** ⇨ **14 %**
  - Establish **150.880 ha of new forest**
  - There is a need for **100.000.000 seedlings of different tree species.**
  - In next 20 years: **7.544 ha with more than 5.000.000 seedlings every year**
  - Realistic goal??
  - In the same time **3.070 ha/year** of reforestation (regeneration).

Challenges

Windstorm damage

Forest dieback

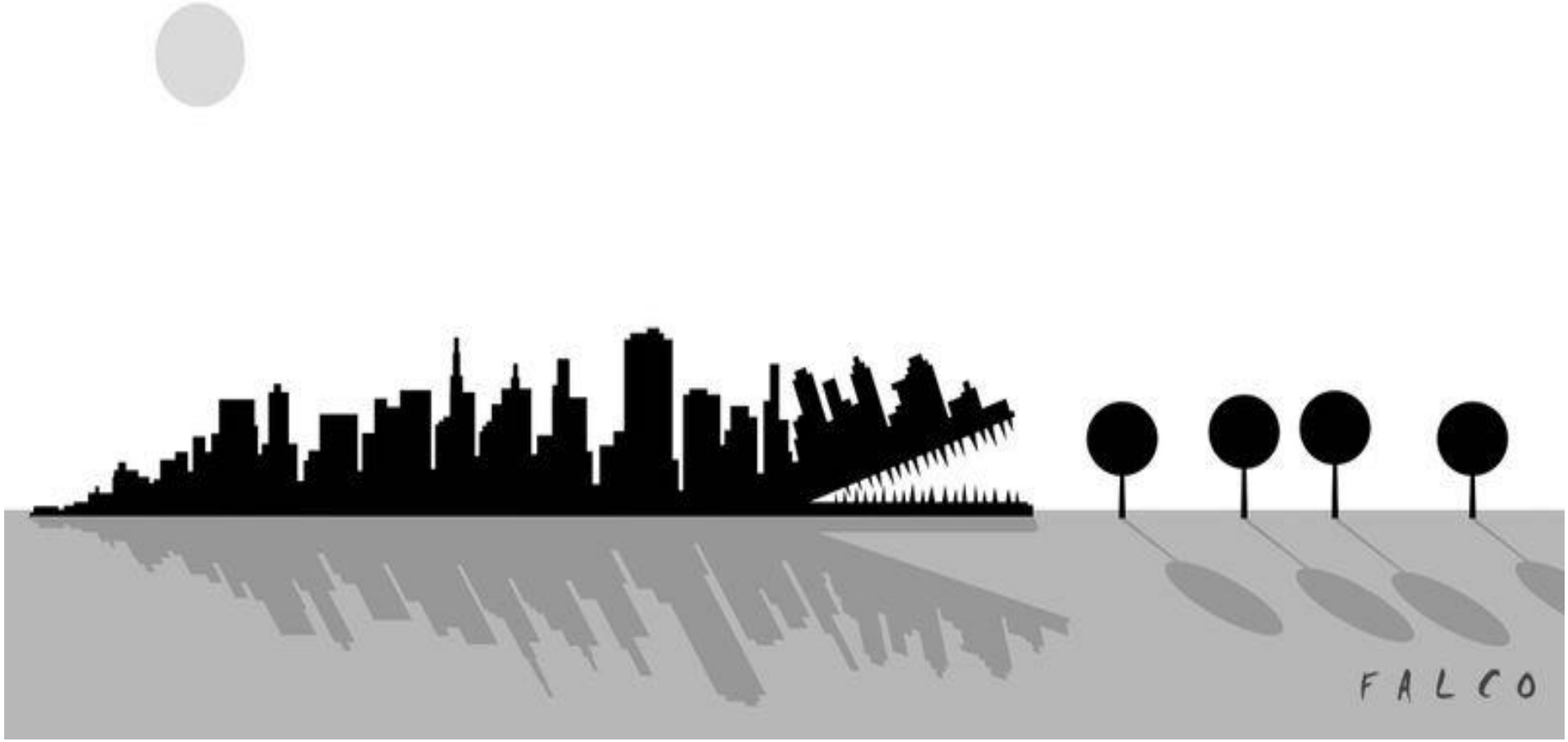
Challenges – July 2023 – Widstorm damages

Challenges – July 2023 – Windstorm damages

Large-scale wind events, July 2023

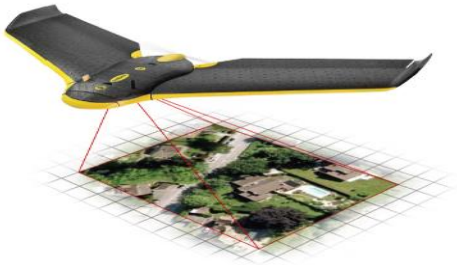
Forest fires and floods

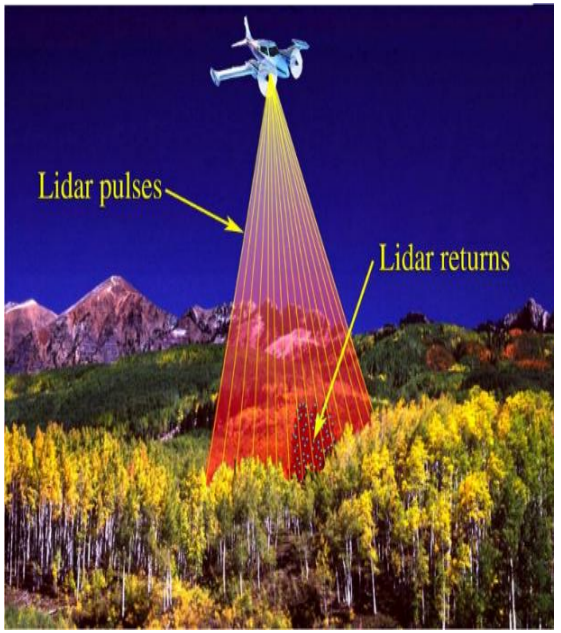
Urban sprawl

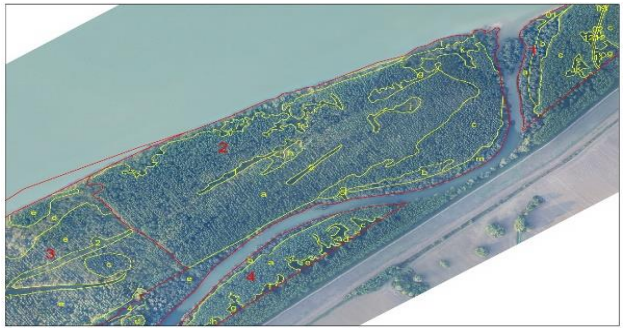


Application of new technologies

- Ortophoto (Mapsoft, GeoInfo, Infomap)
- Satellite imagery–*WorldView2, GeoEye* (GISDATA, VECOM)
- UAV–ortophoto – RGB, NIR
- Electronic calipers







Public company / Market-oriented

Vojvodinašume in projects

Current projects:

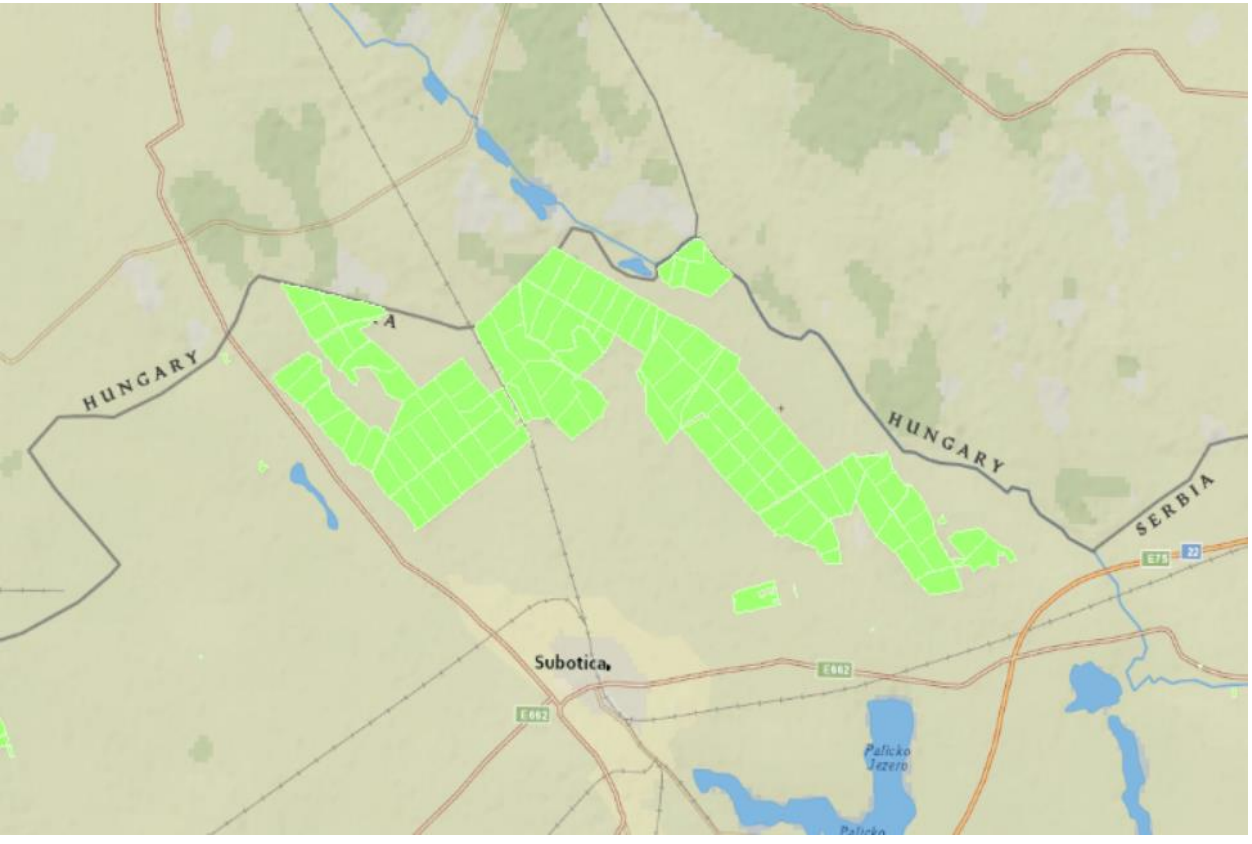
- LIFE Wildisland
- ELP project "Restoring the Amazon of Europe: Reconnecting Riverine Habitats in the First five-country UNESCO Biosphere Reserve,,
- Horizon Cirocco
- LIFE RESTORE for MDD
- STOP FIRES (IPA CBC Hungary-Serbia)
- REBIOFOREST (IPA CBC Croatia-Serbia)

In evaluation proccess:

- FIREGUARD (IPA CBC Romania-Serbia)
- GREEN GRASS OF HOME (IPA CBC Romania-Serbia)
- RETFOR (strategic, CBC Croatia-Serbia)
- Make River Tisa great again (strategic, CBC Hungary Serbia-Serbia)
- DIASPORA 2024

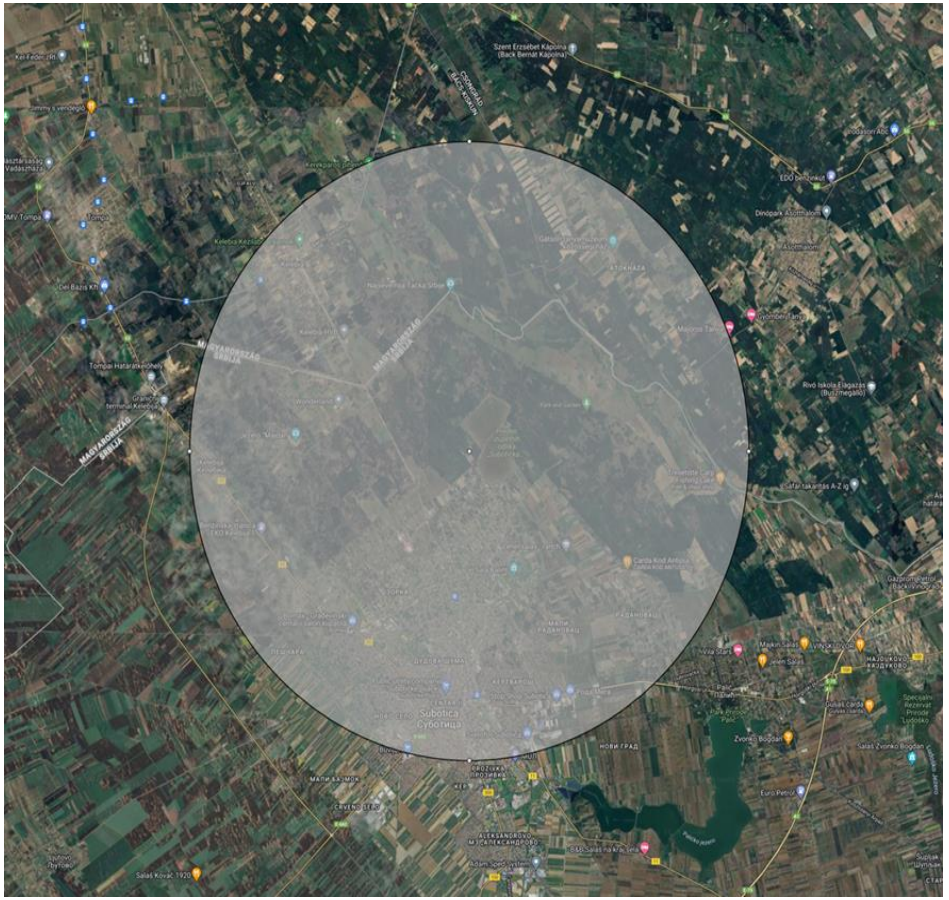
STOP FIRES (IPA CBC Hungary-Serbia)

- Development of integrated system for monitoring and early detection.
- It is designed for prevention of fire spread in forests
- Cameras in automatic mode with the help of an advanced AI-powered algorithm monitor the terrain.



STOP FIRES (IPA CBC Hungary-Serbia)

- In second phase, system will be supplemented with drone monitoring.
- DJI Dock 2 (DJI Matrice 3DT + thermovision camera)



REBIOFORESTS (IPA CBC Croatia-Serbia)

- Increase climate resilience through the application of new solutions in forest ecosystems restoration.
- Two pilot ecosystems (pilot areas) restored after the extreme windstorm occurred in summer of 2023
- It will be provided necessary RGB and multispectral ortophotos/images (drone) of the area defined with satellite images. Drone will be for more detail assessment of pilot location.

Future plans

New project applications

Apllication to Competitive Fund for LFM Community-based Projects – with goal to establish a cross-border, automated wildfire prevention monitoring system through use in a near real-time and based on novel satellite imagery technological advancements (ILFE Novi Sad, Vojvodinašume, National Park "Drina", Srebrenica, BiH) – pilot areas „Deliblato Sands" and National Park "Drina"

Application to DIASOPRA call, Fund for science, Serbia

partners:

- Faculty of Civil Engineering, University of Belgrade,
- Faculty of Forestry, University of Belgrade,
- Institute of Forestry, Belgrade,
- BOKU - Vienna).

Main topics - hyperspectral imaging use for forest monitoring (forest diebacks monitoring) and wood volume calculations using LIDAR), two PhD thesis

THE BAMBI PROJECT – iniciative - Biodiversity Airborne Monitoring Based on Intelligent UAV sampling - Austrian Research Promotion Agency

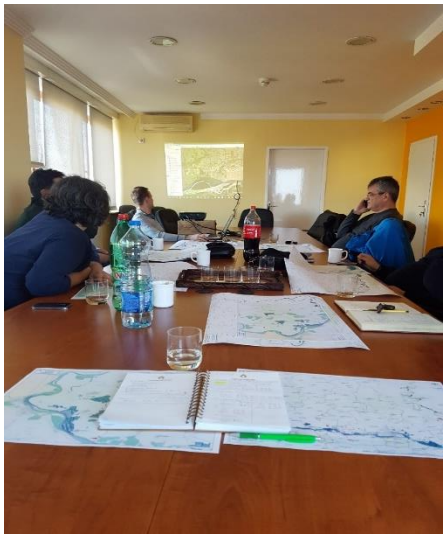
Hot topics

Inventory / forest growing stock - LIDAR

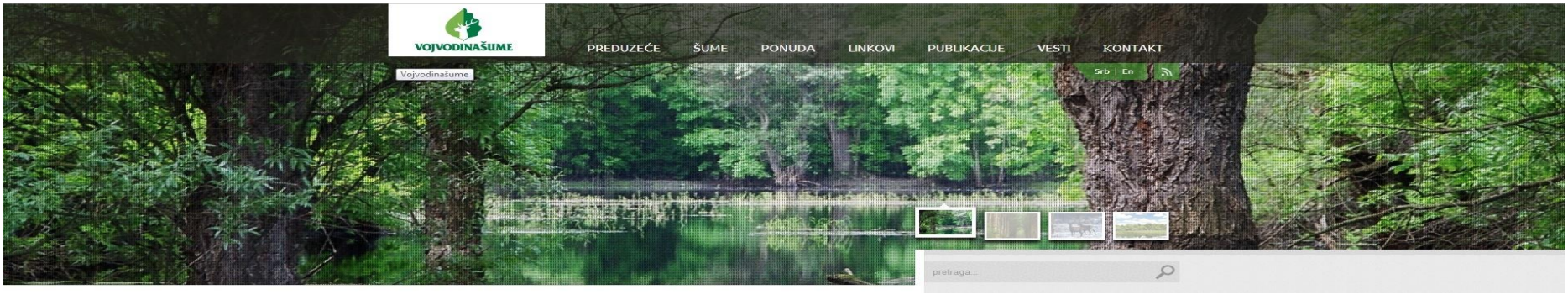
Forest diebacks in oak forests (remote sensing + underground water observation)

Forest fires (monitoring after forest fires, prevention)

Forest monitoring - natural hazards, urban sprawl



Contact



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Thank you for your attention