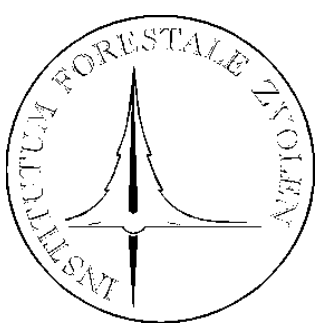


**Project INMEIN: Innovative methods of inventory and monitoring of the Danube floodplain forests using 3-D Remote Sensing technology**

**Slovak-Hungary partnership as background for continuation of cooperation in V4 region**

**Tomáš Bucha  
National Forest centre Zvolen**



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VÝROČIE LESNÍCKEHO VÝSKUMU  
NA SLOVENSKU

ANNIVERSARY OF FOREST RESEARCH  
IN SLOVAKIA

NFC is semi-budgetary forestry agency established  
by the SR Ministry of Agriculture SR.

NFC integrates of forest research, planning, consulting, further  
education and forestry practice into one coherent unit able to better  
respond to challenges facing forestry in the 21st century.

Our staff are currently organised in four institutes:

NFC - Forest Research Institute Zvolen (NFC-FRI Zvolen)

NFC - Institute for Forest Consulting and Education (NFC-IFCE Zvolen)

NFC - Institute for Forest Resources and Information (NFC-IFRI Zvolen)

NFC - Forest Management Planning Institute (NFC-FPI Zvolen)

# Topic:

- INMEIN – short description of successful HU-SK bilateral cooperation (as good example for CBC schemes)
- NFC - Remote Sensing infrastructure and research priorities (as basis for multilateral and european cooperation)
- Possibilities for cooperation – HORIZON 2020, CBC, ENPI and ideas (steps) should be done for success



# INMEIN project as part of HU-SK Cross-border Cooperation Operational Programme

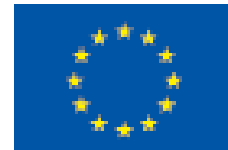
The solution contribute to “Enhance economic competitiveness in the border region” by:

- strengthening of the R & D infrastructure: the completion of the Remote Sensing Laboratory of the project partners (NFC Zvolen and WHU Sopron);
- ensuring of the coordinated use of cross-border research infrastructure: the common use of lidar technology; a common research of methods for lidar data processing, harmonization in building of software infrastructure and sharing of algorithms developed for processing lidar data;
- more intensive institutional cooperation of R&D partners: a preparation of proposal for a harmonized monitoring surveys on forest ecosystems affected by the operation of hydropower Gabčíkovo (within "Agreement between the Government SR and HU on certain temporary technical measures and flows into the Danube and the Moson arm Danube from April 19, 1995 ").



Hungary-Slovakia  
Cross-border Co-operation  
Programme 2007-2013

European Union  
European Regional Development Fund



**Building Partnership**

# How the INMEIN started, what was necessary to do for success



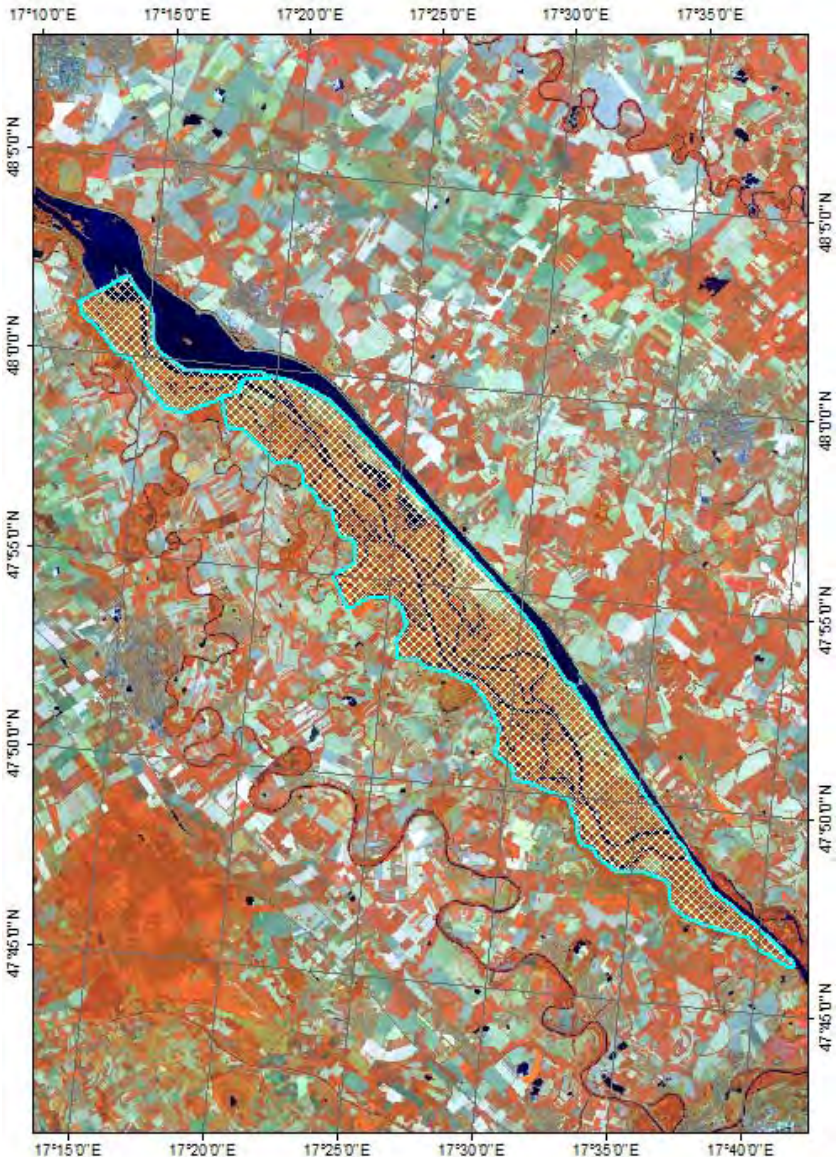
(Basic axis of the project - defining the logical framework)

Problem

Objectives

Activities

Output



Problem: Health condition, status and development of Danube flood plain forest influenced by Gabčíkovo hydropower, especially of softwood indigenous forest communities.

The main idea is to propose innovative monitoring methods and support common approach of monitoring flood forest in term of international obligations between Governments of the Hungary and Slovakia

Inovation is based on assessing interior structure and quantitative characteristics of a forest stand in 3-dimensional space – Lidar.

Due to complexity of the problem and lack of technical and software infrastructure, it was necessary to address the issues in cooperation.

*INMEIN is good example for future CBC  
schemes*

*LETS CONTINUE!*

*Next step:*

*from bilateral to multilateral (European, Pan-  
european) cooperation*

*LETS GO!*

# NFC - Remote Sensing Infrastructure and Reserach Priorities

- **ALS70-CM Airborne LIDAR Sensor + RCD30+PAV 80 + flight mission SW**
- **LPS Core, LPS Stereo, Orima DP-TP/GPS, ERDAS Extensions for ArcGIS, Stereo Analyst**
- **ERDAS IMAGINE Professional + extentions: IMAGINE MrSID Encoder – Workstation version, IMAGINE Vector, IMAGINE ACTOR, IMAGINE Objective, IMAGINE Objective, IMAGINE AutoSync**
- **ERDAS APOLLO Professional**
- **6 ArcGIS, 2 x eCognition, IDRISI**
- **Terrascan, terramodeler, terramatch, terraphotoviewe, terrascanviewer, terrasurvey**
- **TS15 I 1" R1000 Total station w. cam, PS, GS12 GNSS SmartAntenna, CS25 Tablet Computer + Field software**
- **6 workstations of which 2 will be photogrammetric with 3D monitor**



# NFC - Remote Sensing Infrastructure and Reserach Priorities

SW & HW:

- 1 photogrammetric scanner Photoscan 2002
- 1 license for a complete digital photogrammetric line consisting of moduls of Image Station Automatic Triangulation (ISAT), automated generation of Digital Terrain Model ((DTM Collection), **Image Station Automated Elevations (ISAE)** and generation of ortho-projects (**OrthoPro, GeoMedia**)
- 4 photogrammetric stations + 4 licenses of ImageStation SSK for vector mapping above stereomodels in Microstation V7 environment
- 1 photogrammetric station + 1 license of Image Station SG with 20“ 3D PLANAR SD 2020 monitor,
- **1 automated aerotriangulation MATCH AT**
- 9 licenses of Microstation V7, 2 licenses KOKES + **ATLAS**
- 1 license of SW LIDARBOX - SCOP++ Kernel, SCOP++ LIDAR , DTMaster Stereo, SCOP++ Analyzer
- Photogrammetric station with 22“ 3D PLANAR monitor
- during 2012 1 license of SW for orthophoto rectification, mosaicing and image colour levelling **ORTHOBOX**
- 2 geodetic GNSS receivers Leica GX 1230 + GNSS
- 4 single frequency GIS GPS receivers Leica SR 20
- 1 geodetic total station Geodimeter 610 (1998) + Trimble Control Unit



# RS Research Priorities: Lidar and object based method for forest monitoring and inventory, software development, web services.

The image displays the reFlex remote Forest Land explorer application. The main window shows a 3D point cloud of a forest with a blue cone indicating the sensor's field of view. An 'Application Info' window is open, displaying 'reFlex remote Forest Land explorer'. Below the main view, there is a grid of scan images labeled 'AA43\_Scan\_001' through 'AA43\_Scan\_004'. A sidebar on the left contains the 're remote' logo, 'Trees and Stand Survey', and 'Tools' buttons. A browser window in the foreground shows a web application titled 'Porovnanie satelitných snímok z rôznych období' (Comparison of satellite images from different periods) for the years 1990-2013. The browser address bar shows 'www.nlcsk.sk/stales/stales\_swipe\_tool.html'. The web application includes a legend, navigation controls, and a map showing the Danube River (Olú Dunajská Streda) and surrounding areas like Gabčíkovo. The map is split into two panels for comparison, with 'Ľavá strana: 1990' and 'Pravá strana: 2013' at the bottom. The ESRI logo is visible in the bottom right corner of the map area.

# HORIZON 2020, CBC, ENPI: Ways for strengthening cooperation and steps which should be done for success.



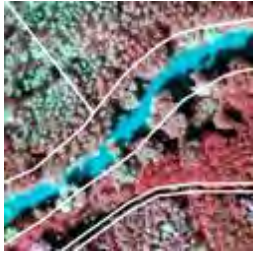
The screenshot shows the Horizon 2020 Participant Portal. The main navigation bar includes 'HOME', 'FUNDING OPPORTUNITIES', 'HOW TO PARTICIPATE', 'EXPERTS', and 'SUPPORT'. A 'LOGIN' button and a 'REGISTER' button are also visible. The main content area displays a funding opportunity titled 'Innovative, Sustainable and Inclusive Bioeconomy' (H2020-ISIB-2014-2). The opportunity is currently 'Open' and has a total call budget of €16,000,000. The deadline for Stage 2 is 2014-06-26 +17:00:00 (Brussels local time). The main pillar is 'Societal Challenges' and the OJ reference is 'OJ C361 of 11 December 2013'. The topic is 'Improved forest data' and the sub call is 'H2020-ISIB-2014-2015'.

<b>Publication date</b>	2013-12-11	<b>Deadline Date</b>	2014-03-12 17:00:00 (Brussels local time)
<b>Total Call Budget</b>	€16,000,000	<b>Stage 2</b>	2014-06-26 +17:00:00 (Brussels local time)
<b>Status</b>	Open	<b>Main Pillar</b>	Societal Challenges
		<b>OJ reference</b>	OJ C361 of 11 December 2013

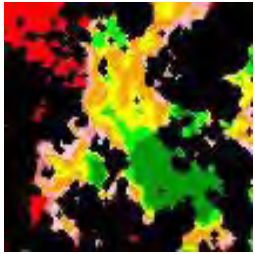
**Topic:** Improved forest data **ISIB-04a-2014**

- Establish V4 Lidar Expert Consortium (**V4LIC**)  
Intension is to:
- extend bilateral successful cooperation into European level
  - integrate V4 scientific potential
  - be stronger and more visible
  - act as one unit (if all benefit)

# V4 lidar expert consortium could ensure:



coordinated use of cross-border research infrastructure -  
shared use of Lidar technology



improvement of monitoring and forest inventory methodologies, a common research of methods of lidar data processing; harmonization in building of software infrastructure and sharing of algorithms developed for processing Lidar data.



*Stand texture* represents typical spatial arrangement set of *forest land* pixels on image

*Stand structure* = the internal spatial and functional arrangement of individual element of *forest stand*



building of a partnership among involved institutions.

Thank you for your attention