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Cross-border Co-operation Programme

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European Regional Development Fund

Hydrological changes and potential of integrated forest and water management of lowland oak (Quercus robur) forests in Croatia

Kaszó**, 30.05.2018.**

Nataša Rap Croatian Forests Ltd.

Ivan Pilaš Croatian Forests Research Institute, Jastrebarsko

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Oak Protection

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The goals of the presentation:

- (I)Overview of the forest and water practices in lowland areas, (II)research motivation and (III)future challenges in Croatia (Ivan Pilas)
- (IV)Brief presentation of the new Croatia-Hungary INTERREG „Oak protection” project (Natasa Rap)

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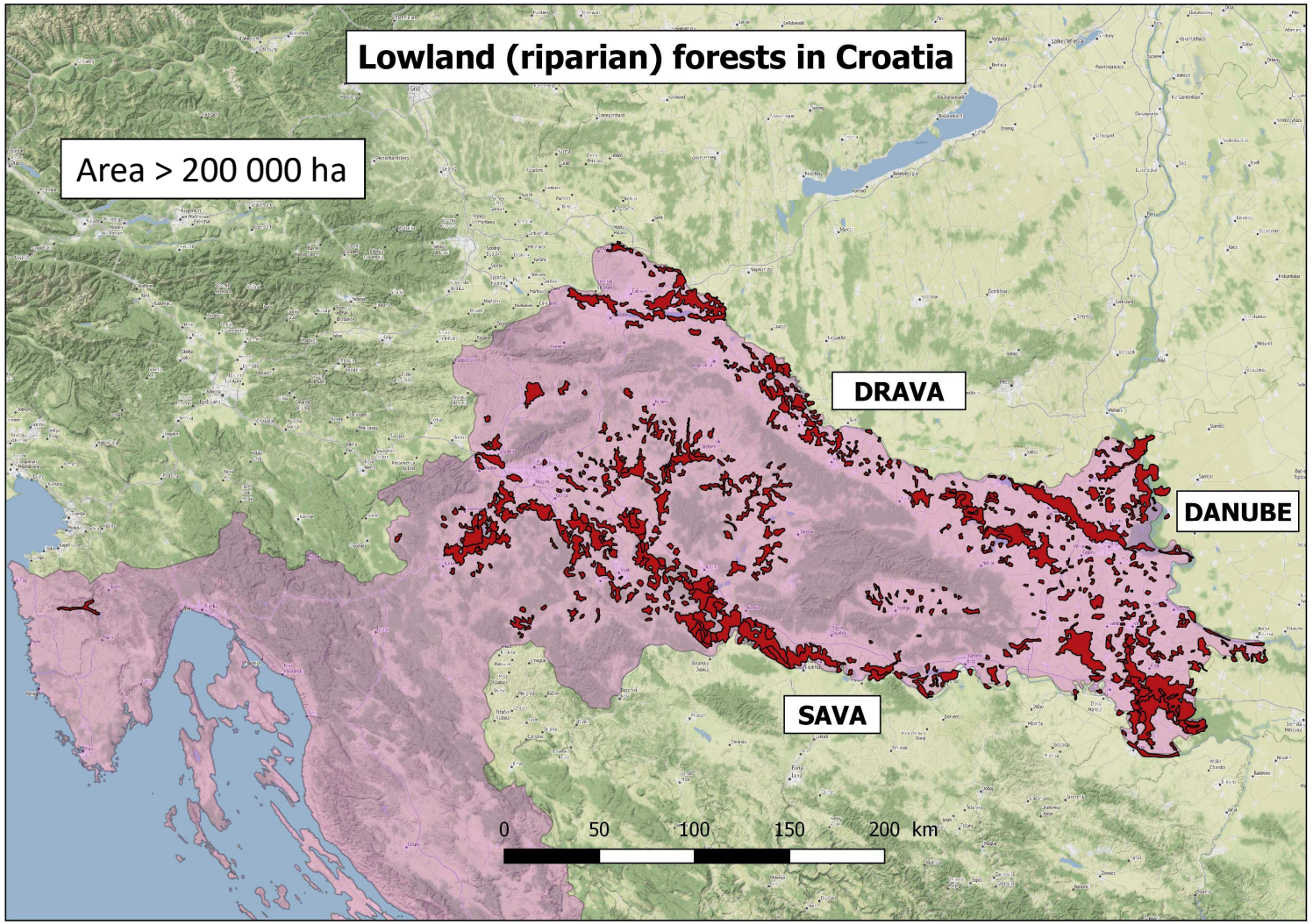

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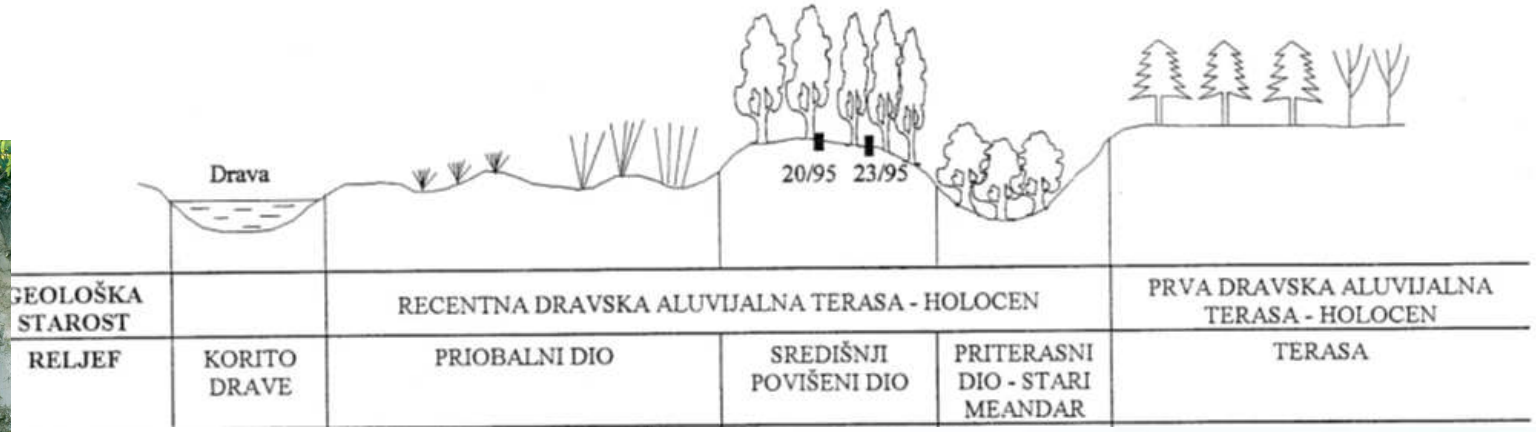
WFD GDE – Groundwater dependent ecosystems

Salici-Populetum

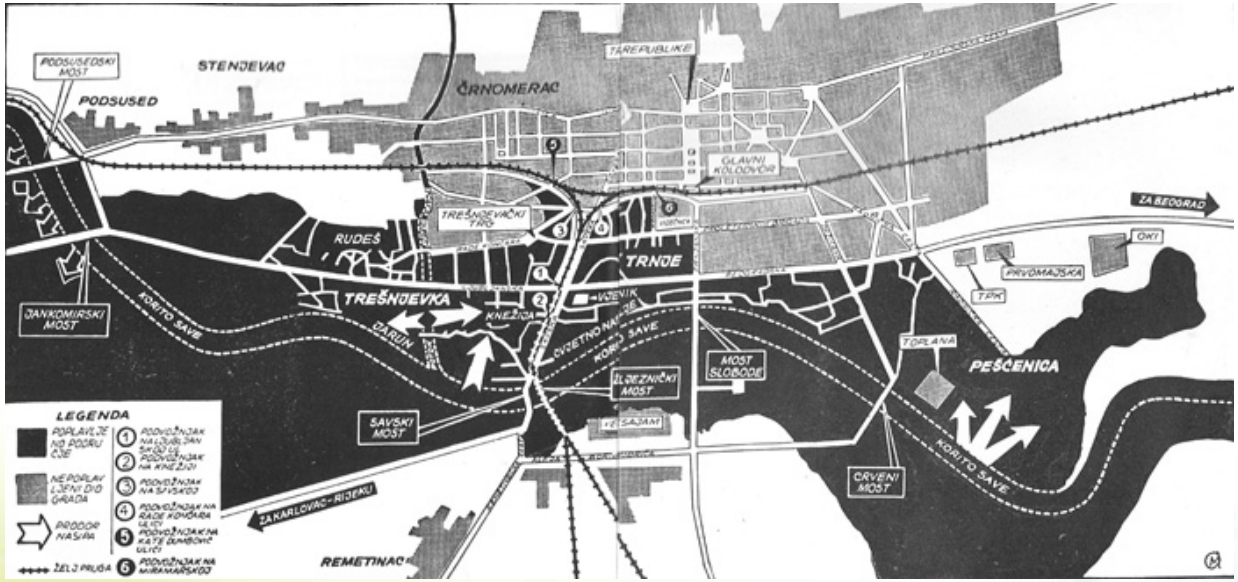


Frangulo alnetum-glutinosae

Genisto elatae-Quercetum roboris

Carpino betuli-Quercetum roboris

Development of water protection policy in Croatia
Zagreb flood – 26.10.1964

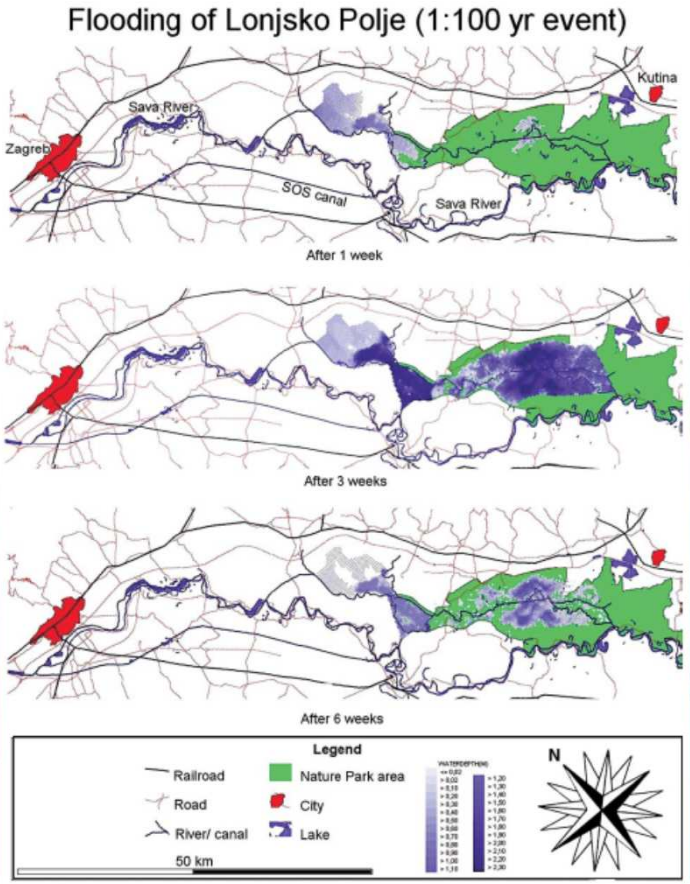


Consequences

- Direct impact on 180 000 citizens, 17 people died
- After the withdrawal of water, the construction of the flood defense system „Middle Posavina” initiated, within which cities threatened by flooding from Sava (Zagreb, Karlovac and Sisak) were defended by defensive floods and flood discharges.
- Initiated extencive construction works: the use of natural areas and lowland forests along river as a flood retention areas, construction of embankments along the settlements, canalization of rivers…

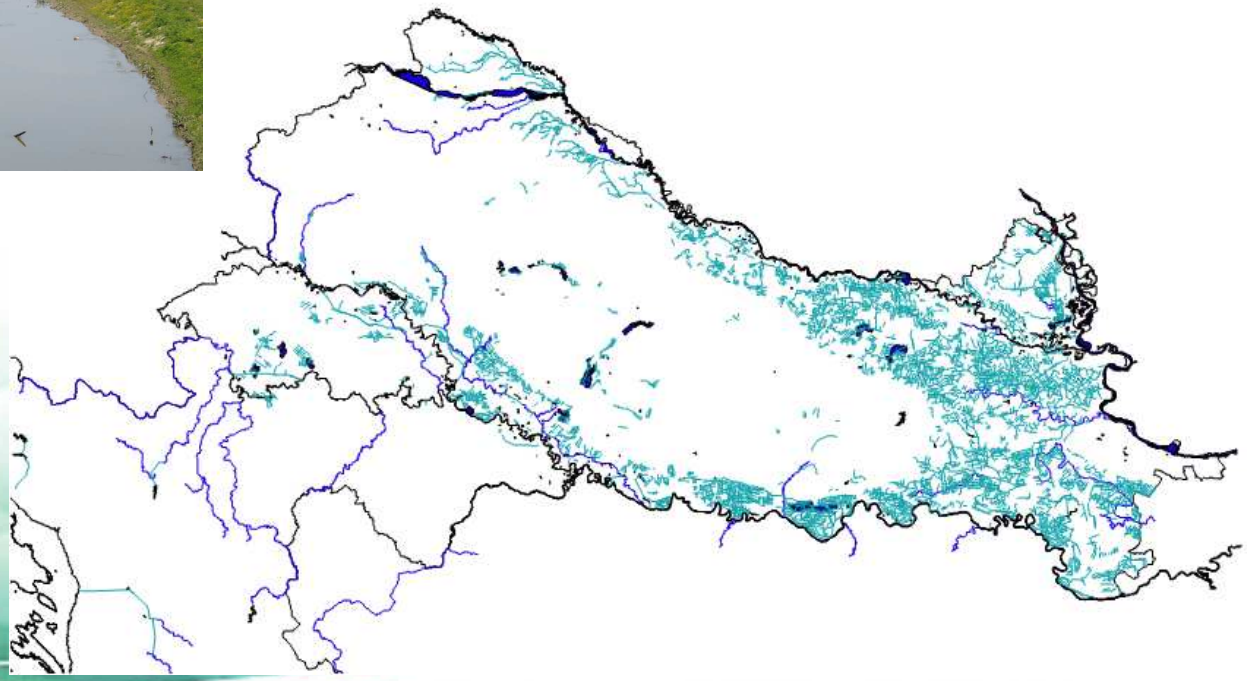
Flood defense system „Middle Posavina” – Use of the riparian lowland forests like flood retention areas

Nature park Lonjsko polje 237 km2

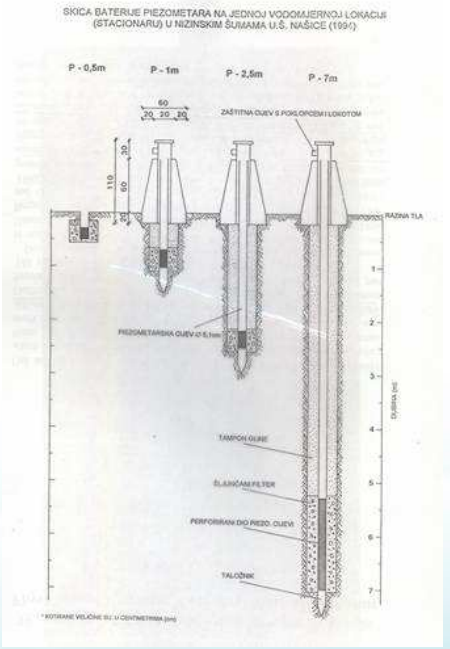


Antrophogenic impact on the surface and groundwater regime - River canalizations and construction of the agricultural drainage networks

Oak decline - According to the forest inventory, from 1996 to 2005 the total of 2 700 000 m^3 of dried oak trees was removed from the Croatian forests



I phase (1981)- The establishment of groundwater monitoring system with piezometric pipes and data collection



- In **the creation of a database** and information on groundwater suitable for scientific and technical discussions on the planning and construction of new hydro-technical constructions (canals, accumulations)
- In **assessing the critical value of hydrological parameters** important to preserve the stability of lowland forests
- In **evaluating the importance of water** over other causal factors of forest dieback

II phase (2006) - assessing the critical value of hydrological parameters - Reconstruction of natural groundwater regime in lowland forests in Western Croatia (5 forest areas, 56 piezometric stations)

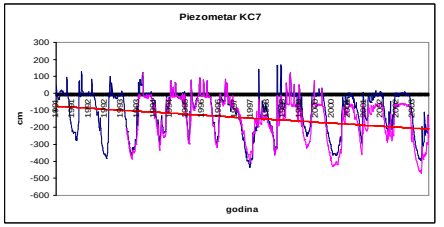
Pokupski bazen

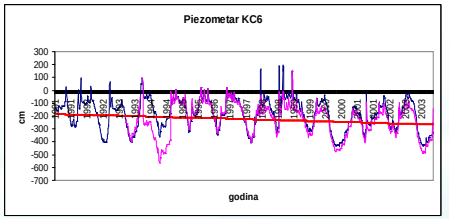
Česma, Bolč-Velika

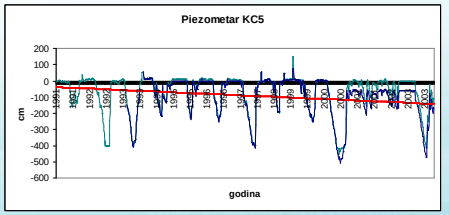
Varoški lug

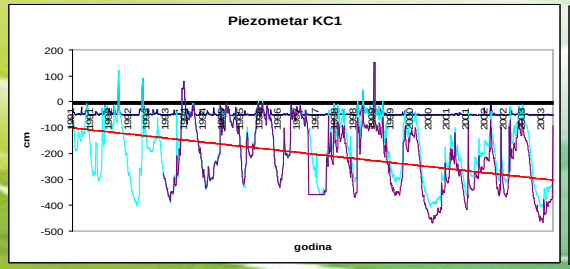
Turopoljski lug

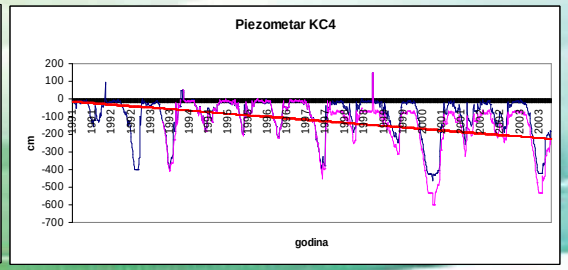
Žutica

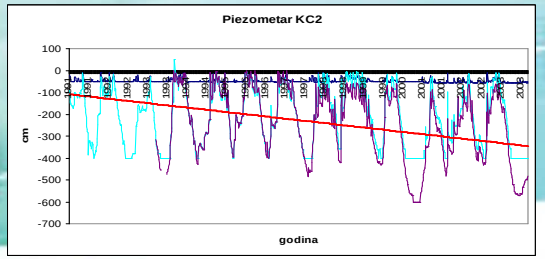




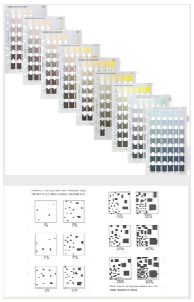


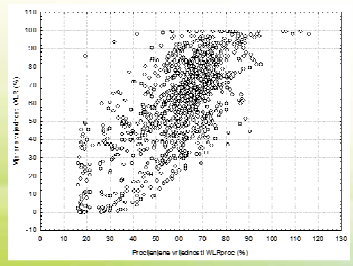






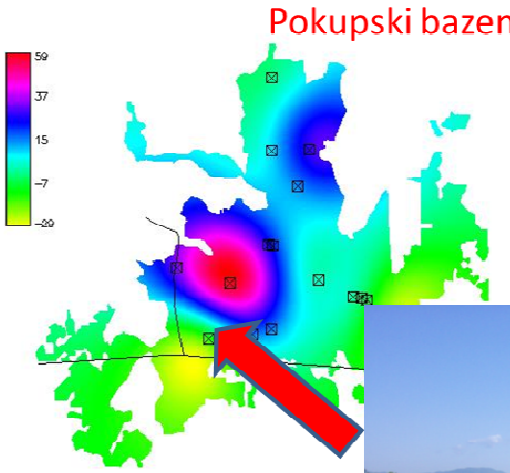
GIS layers of changes in waterlogging from the natural state, based on morphology of hydromorphic soils (relict indicators)





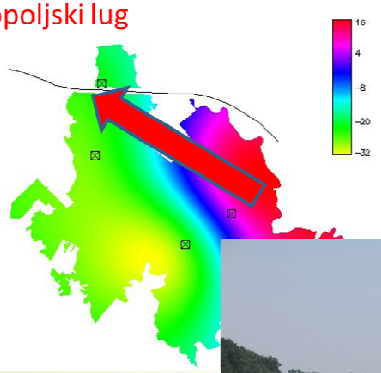
Redox concentrations

Redox depletions

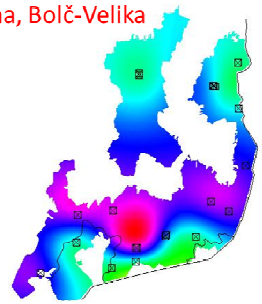


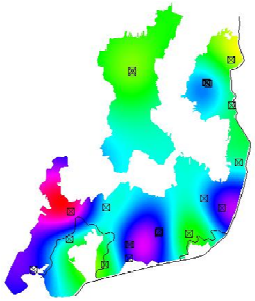
COST ACTION FORMAN - Forest Management and The Water Cycle (2007-2011)

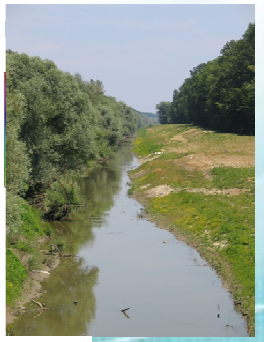
Turopoljski lug

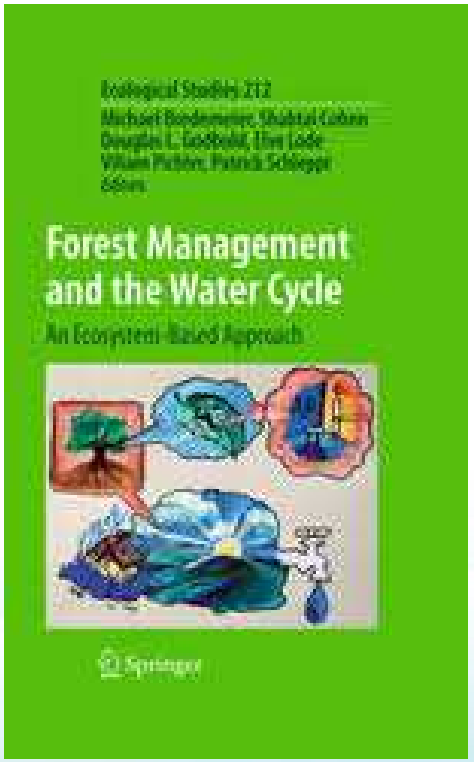


Česma, Bolč-Velika



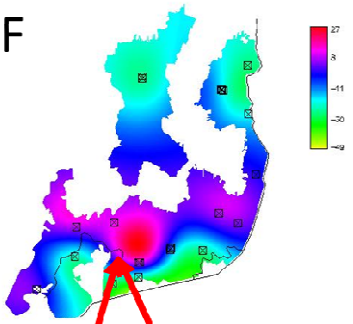






Phase III- Active water re-construction measures in forests (fine scale!)

RESTORATION OF
OLD ČESMA



2007

Second accumulation in 2009

Old Česma riverbed
Before the construction

After the construction

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Protection of the English oak in the crossborder area
´Oak protection'

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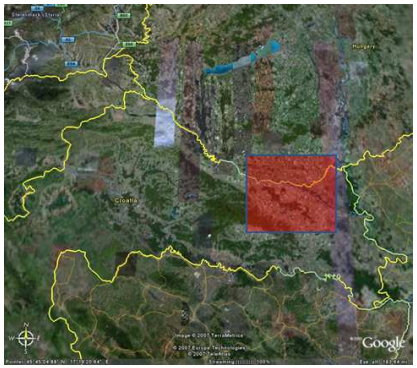
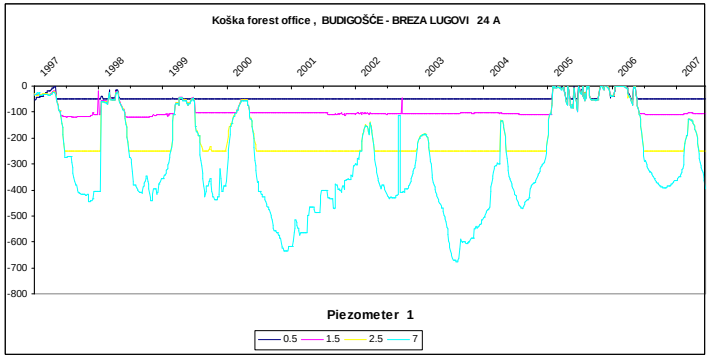
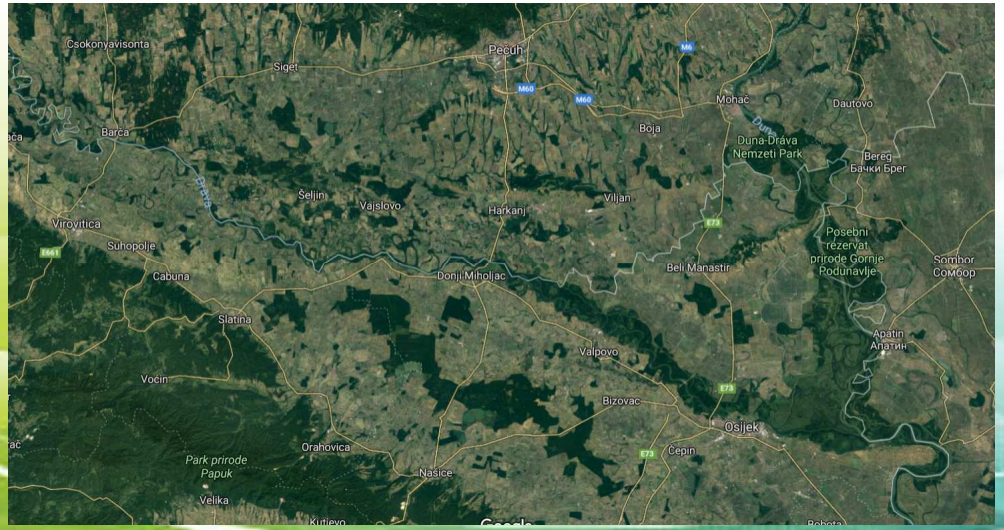
Project motivation – Observed Rapid decline of Groundwater tables after 2000!



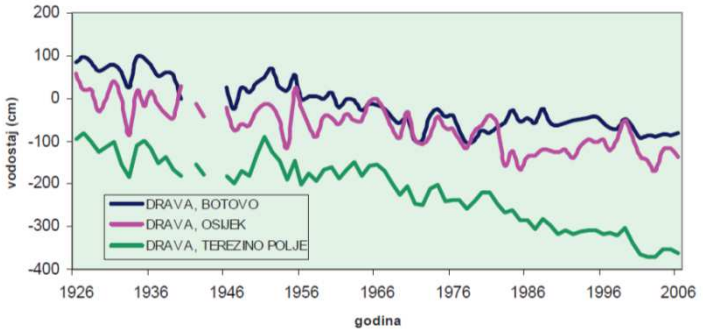




YEARLY DROP OF GROUNDWATER TABLES FROM AVERAGES, 1997-2015

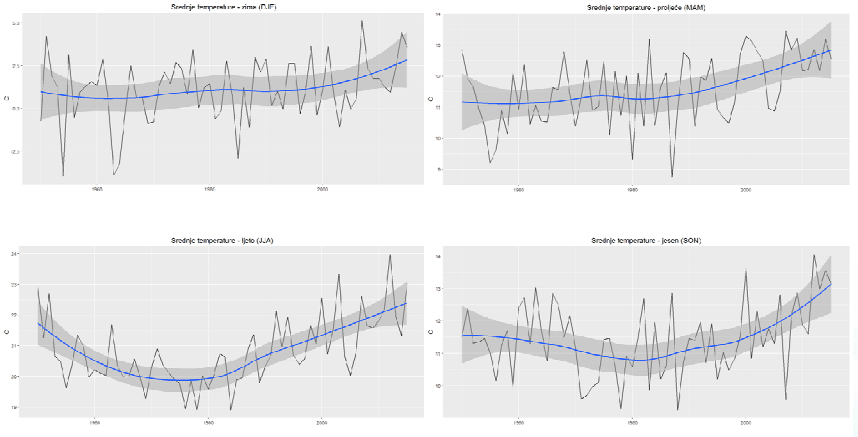
Hydro-climatic changes in the region (*summer-autumn desiccation, increased runoff and more extreme precipitation, lowering of winter groundwater recharge due to snow reduction and Drava riverbed erosion!*)

Trends of minimal Drava waterlevels

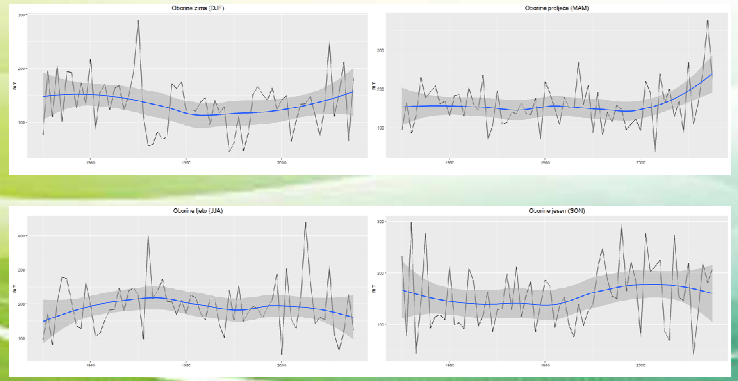


Slika 2.5. Vremenski nizovi najnižih godišnjih vodostaja zabilježenih na karakterističnim stanicama na Dravi

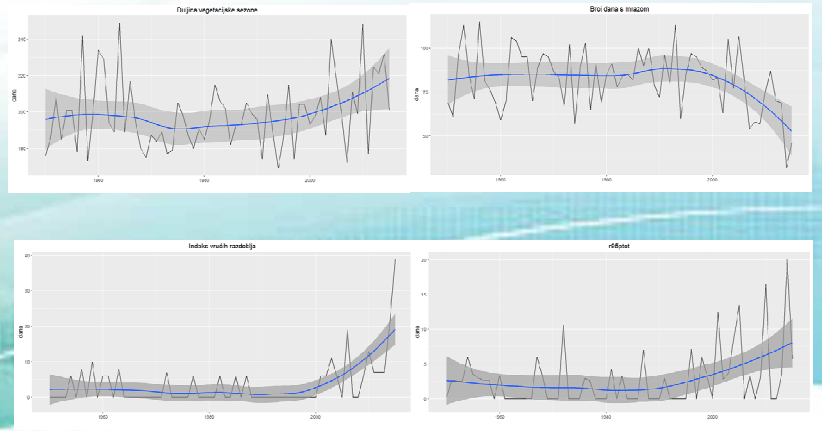
Seasonal temperature trends



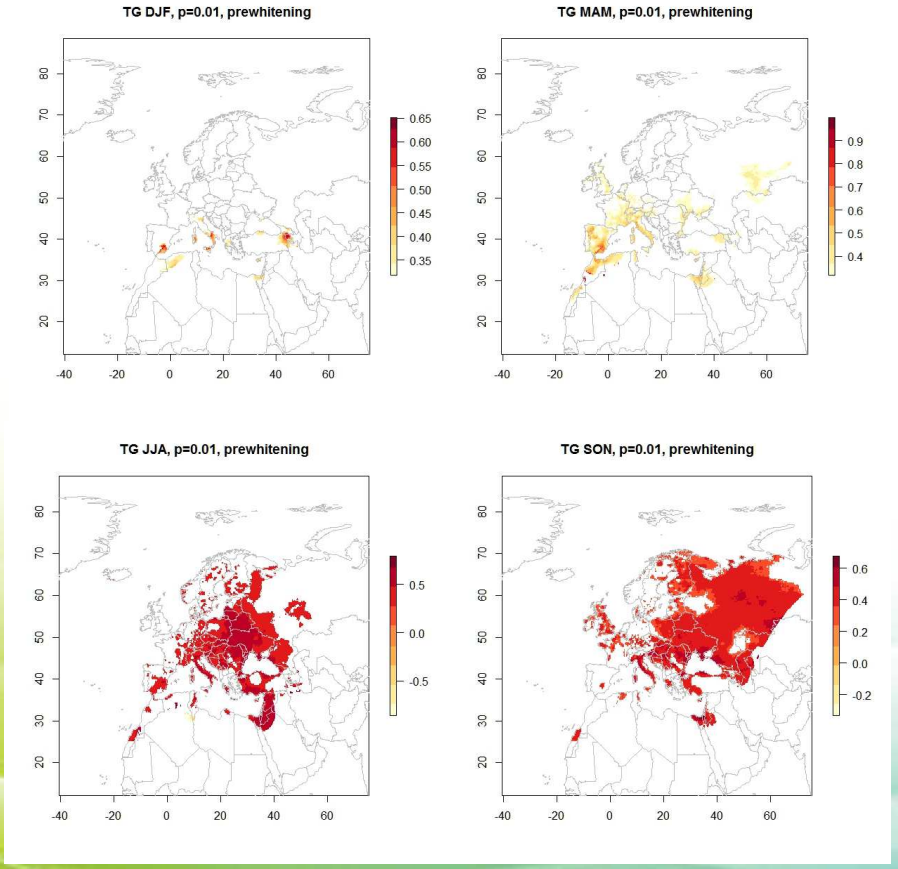
Seasonal precipitation trends

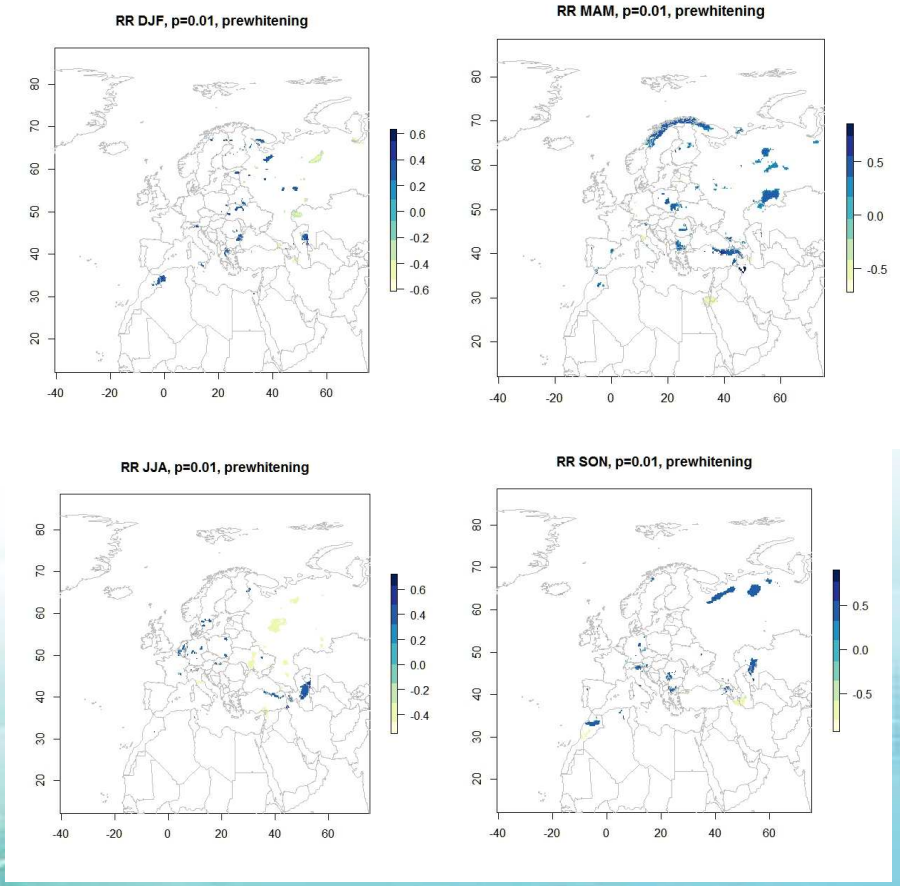


Indices of climatic extreemes



Observed temperature and precipitation trends in Europe 1982-2015 (Pilas 2018)

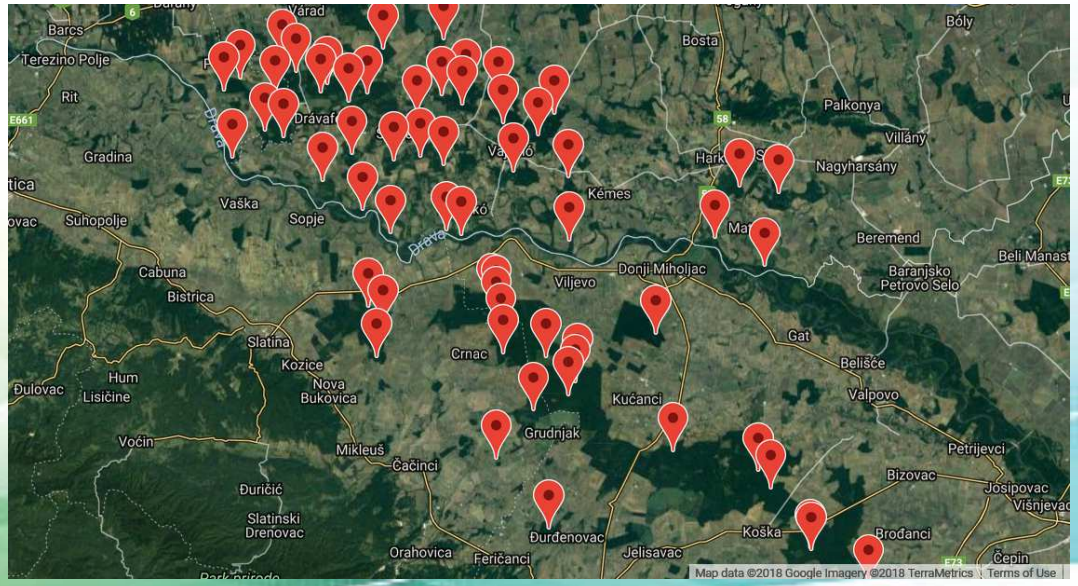




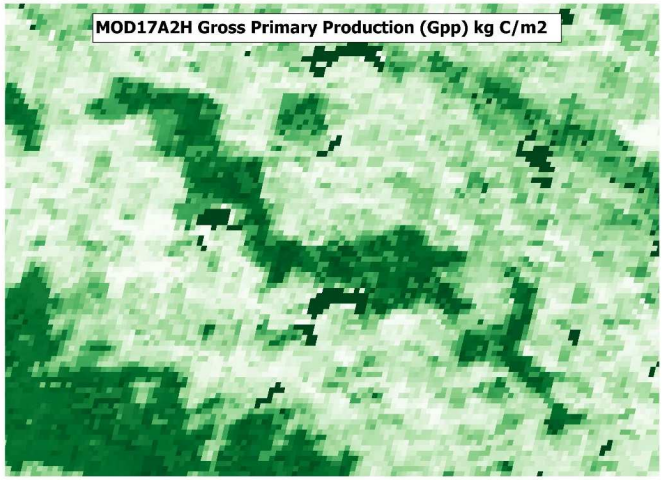
The hydrological objectives of the Oak protection project:

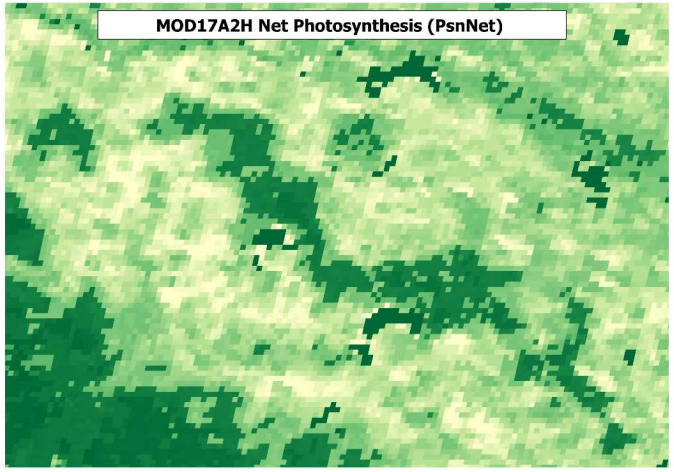
I) transboundary automatic groundwater monitoring system for ground and surface water (piezometers, loggers)

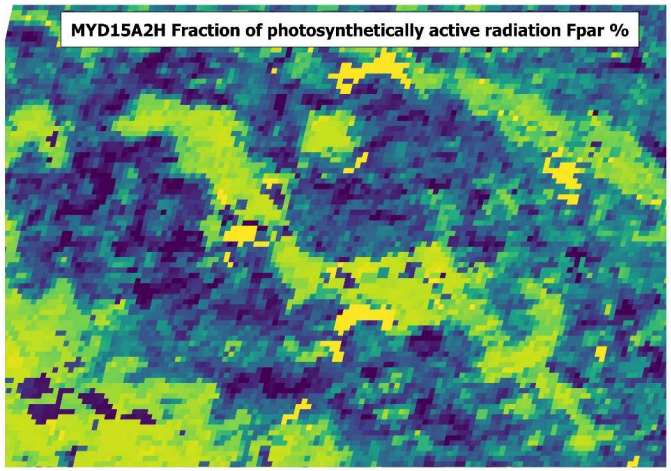
- monitoring of the present and future hydrologic changes and assessment of ecosystems suitability for Quercus robur

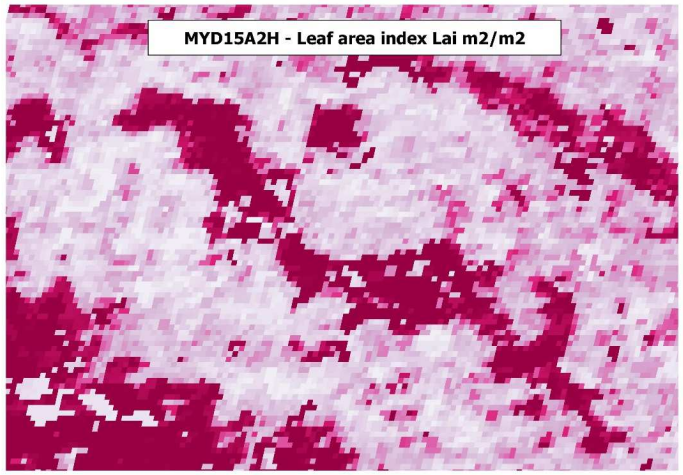


II) Real time climate monitoring and the drought early warning system (Web-Gis)



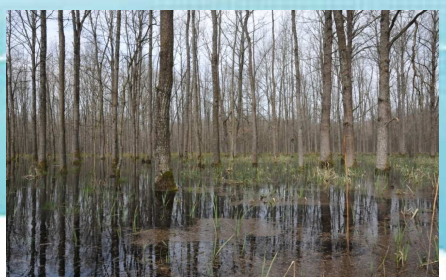


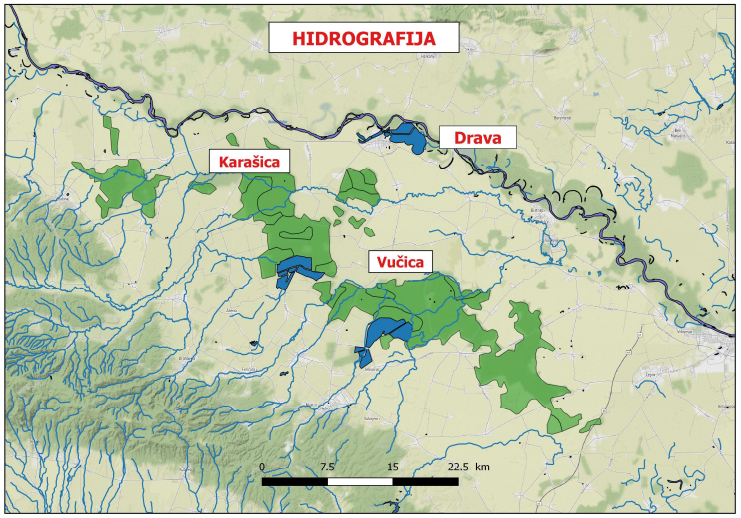




III) Evaluation and proposal of adaptive forest-water retention measures, based on Lidar topography, to enhance ecosystem stability

- Detail **microtopographic asessment** – LIDAR
- **Groundwater management** – measures to retain water in the landscape and recharge groundwater tables (DRAINMOD, 1D, 3D models)
- **Flood management** – estabilishement of sustainable flooding regime (reducing of flood duration and prolonged accumulation of surface water)





Partnership
similarities and differences

Mecsekerdő Zrt.		FAB Našice
550000 ha	*managment area*	74000 ha
360.000 m³	*annual increase of wood mass*	550.000 m³
89% native species	*forests*	*> 90% native forests*
5 forestrys	*managment units*	9 forestrys
oak stands, invasive species	*problems*	oak stands, invasive species
lowering the groundwater level		lowering the groundwatter level

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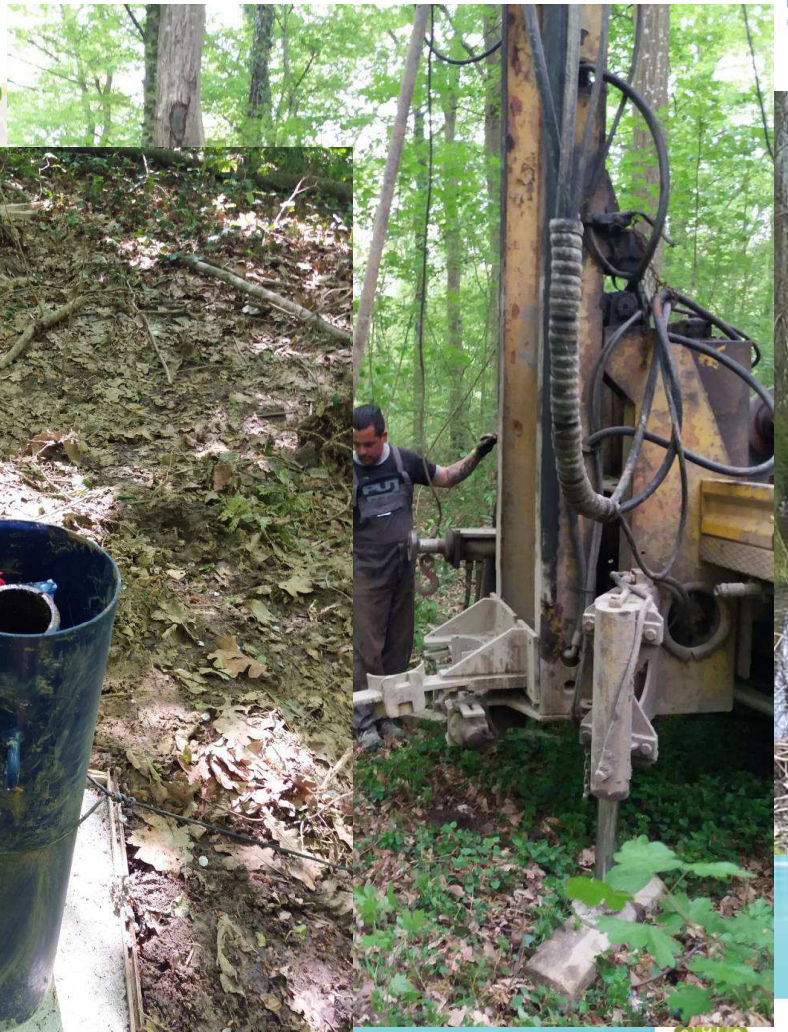
Aims of the

The main goal is to pr



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2. Survey and suppressing of invasive species:

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Budget: total amounth: 638 644,62 €

Mecsekerdő Zrt: 407 616,25 €

FAB Našice: 231 028,37 €

Results: - decisions based on ground water monitoring facts

- establishing water managment activity (sluices, canals, water reservoir..)
- better efficiency in fighting the invasive species
- public awareness of the problems in forest management and efforts invested in the conservation of natural habitats and biodiversity

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Köszönöm a figyelmet!

Thank you for your attention!

Hvala na pažnji!

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