Adapting to Climate change in relation to WATER

Changes in the qualitative and quantitative parameters of waters in the light of climate change

28/11/2023 Budapest

OUR WATER VISION

DANUBE REGION strategy Water Quality

Interreg Programme Danube Region

Interreg Danube Transnational Programme

DANUBE REGION strategy Environmental risks

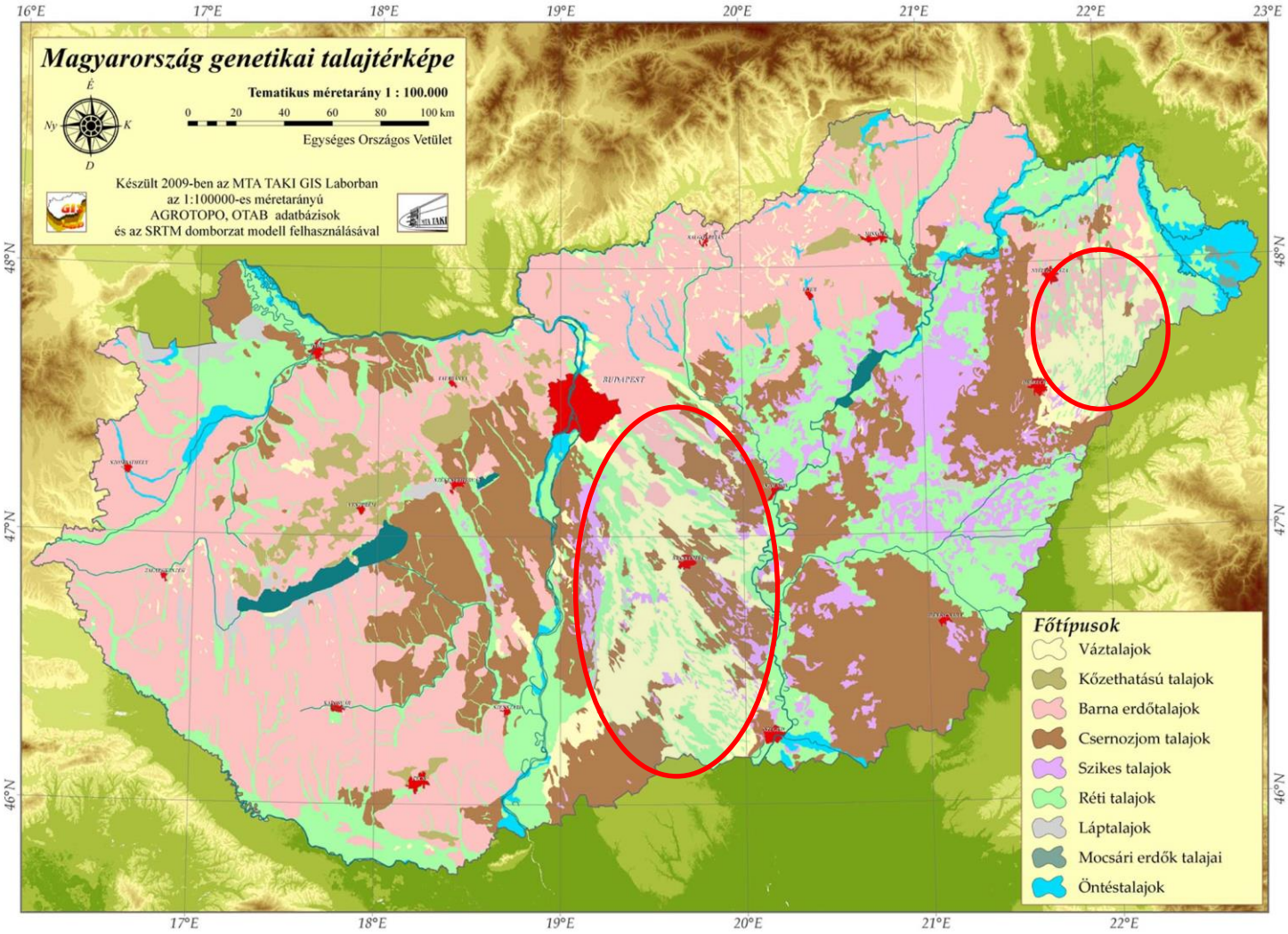
Co-funded by the European Union

Advantages of the utilisation of sewage sludge in the improvement of the retention capacity of soils

Mátyás Devecseri, Senior Technical Advisor (OVF)
István Padra, Environmental Consultant

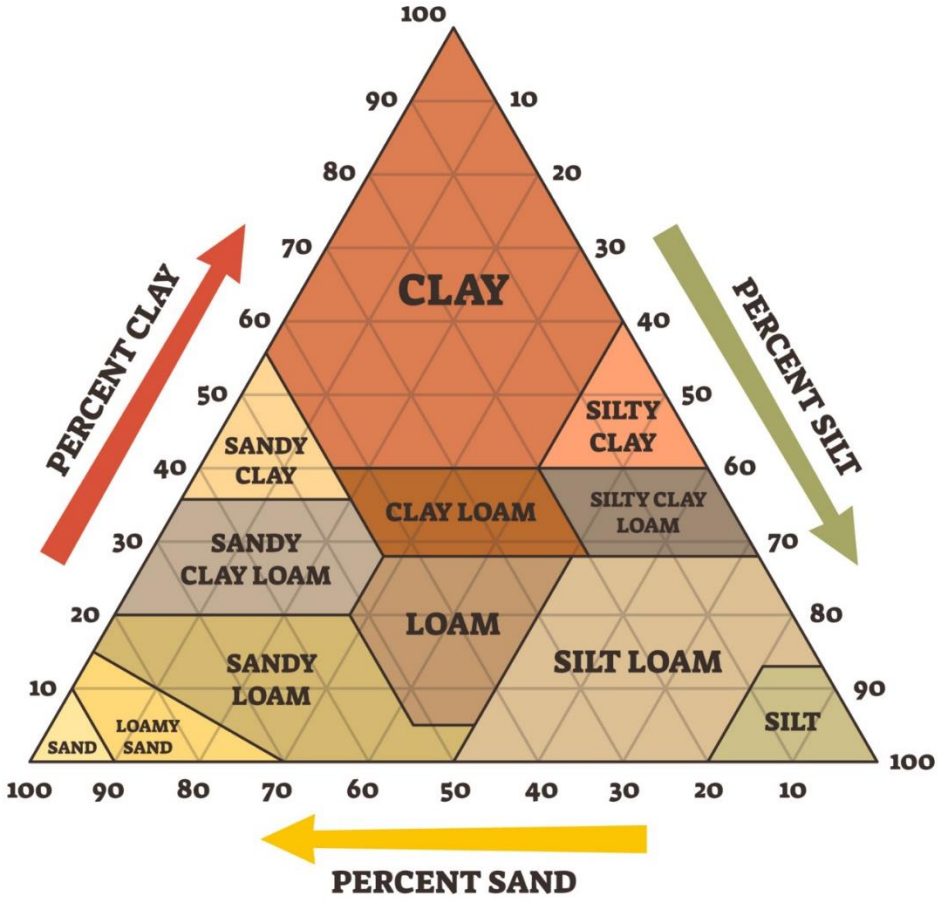
OUR WATER VISION

Vulnerable areas



OUR WATER VISION

Soil types



OUR WATER VISION

Causes of climate change (local and global)

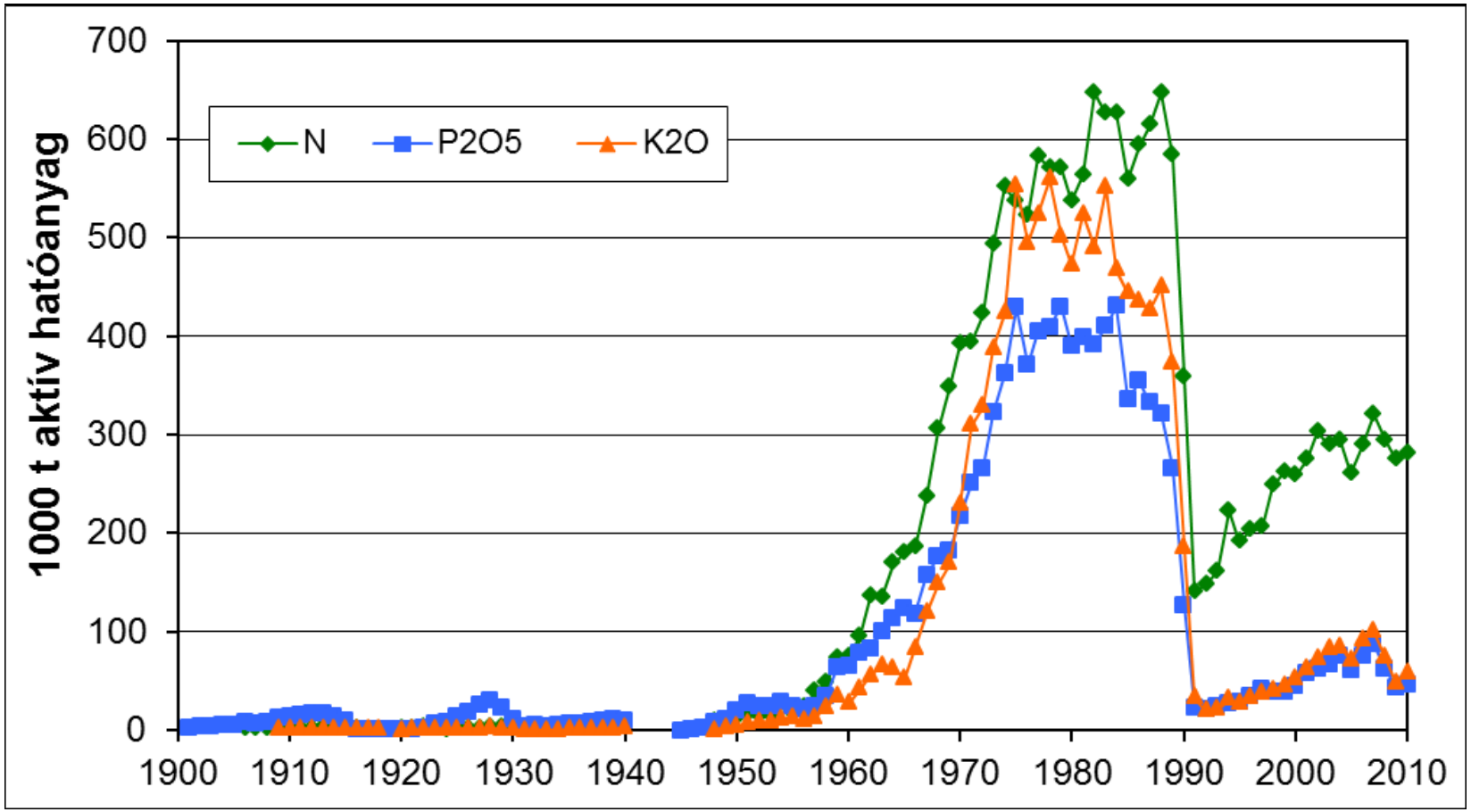
- **Spread of industry-like agriculture**
  - Large field sizes (loss of mosaicism),
  - Destruction of natural vegetation,
  - Removal of forest strips (field protection),
  - Water management: canalisation, dewatering,
  - Agricultural chemisation
    - One-sided fertilizer use,
    - Chemical crop protection,
  - Intensive soil disturbance – loss of biodiversity,
  - Spread of monocultures e.g: cereal, oil and protein crops,
  - Reduction of livestock (lack of organic matter),
  - Irrigation (on soils w/ poor water balance, w/o organic matter supplementation),
  - Biomass burning (removing organic matter from the ecosystem).
  - Uncovered topsoil for most of the year (erosion, deflation, organic matter exhalation)
- **Natural warming**

OUR WATER VISION

Causes of climate change (local and global)

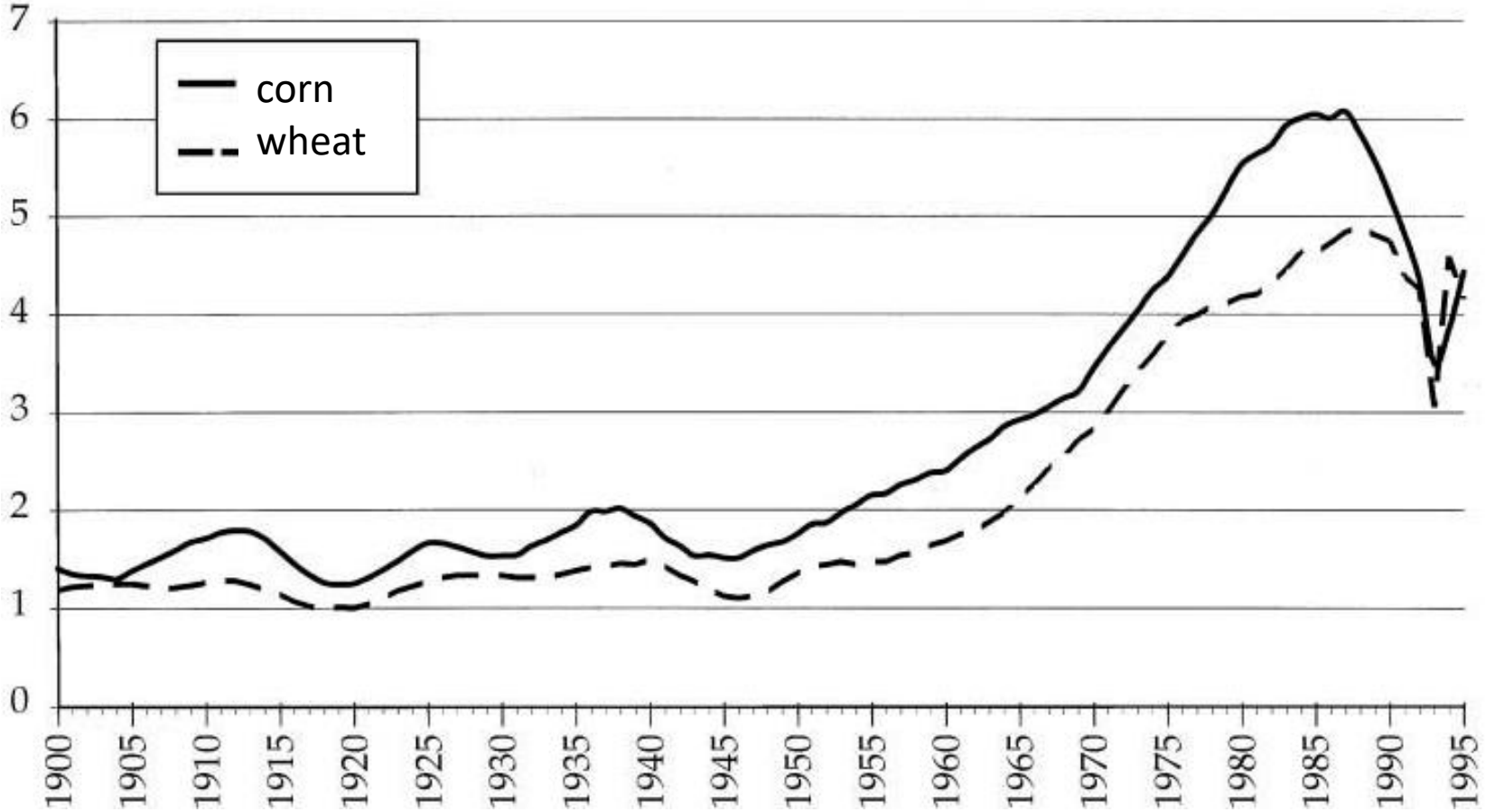
OUR WATER VISION

Fertilizer



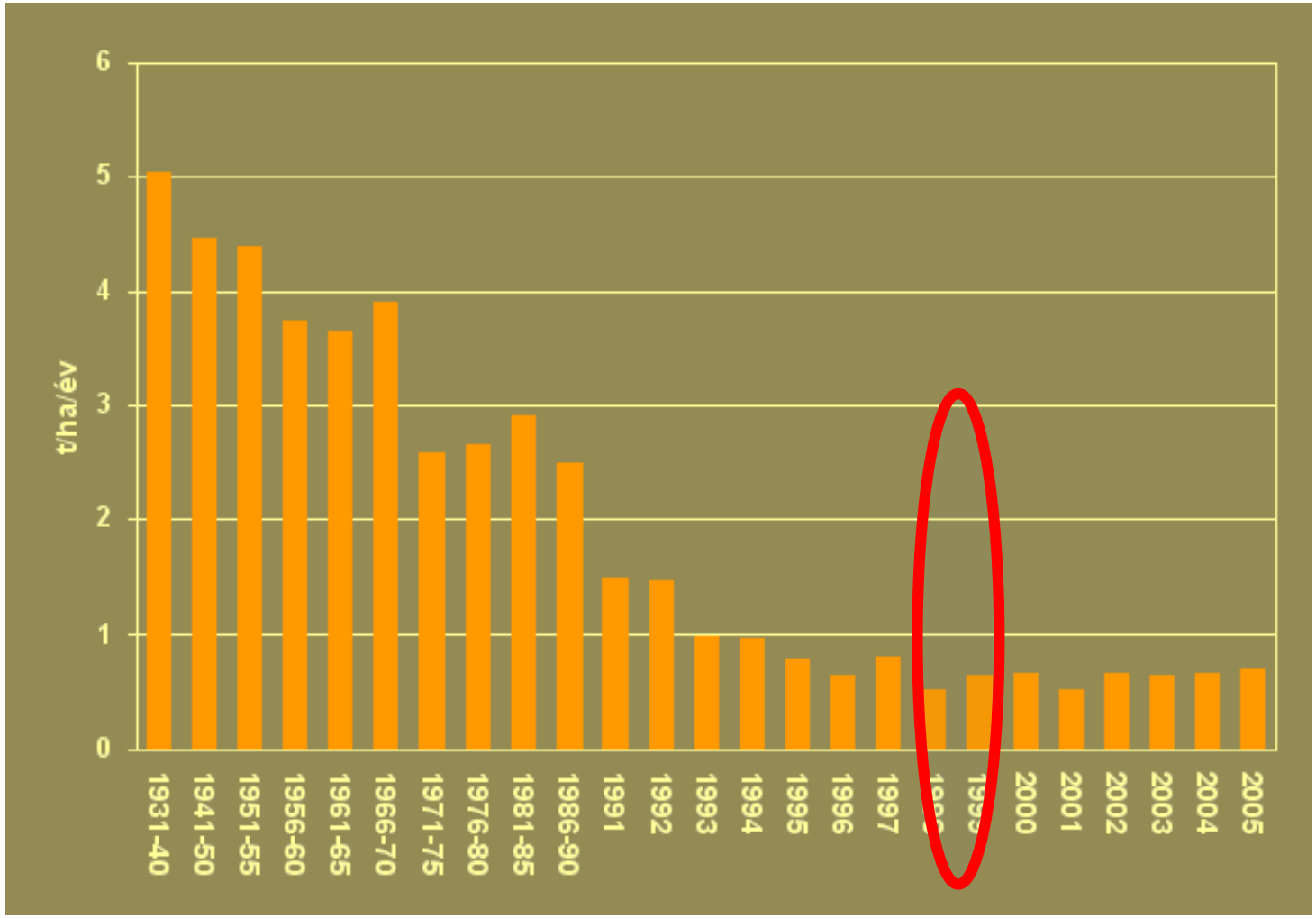
OUR WATER VISION

Fertilizer



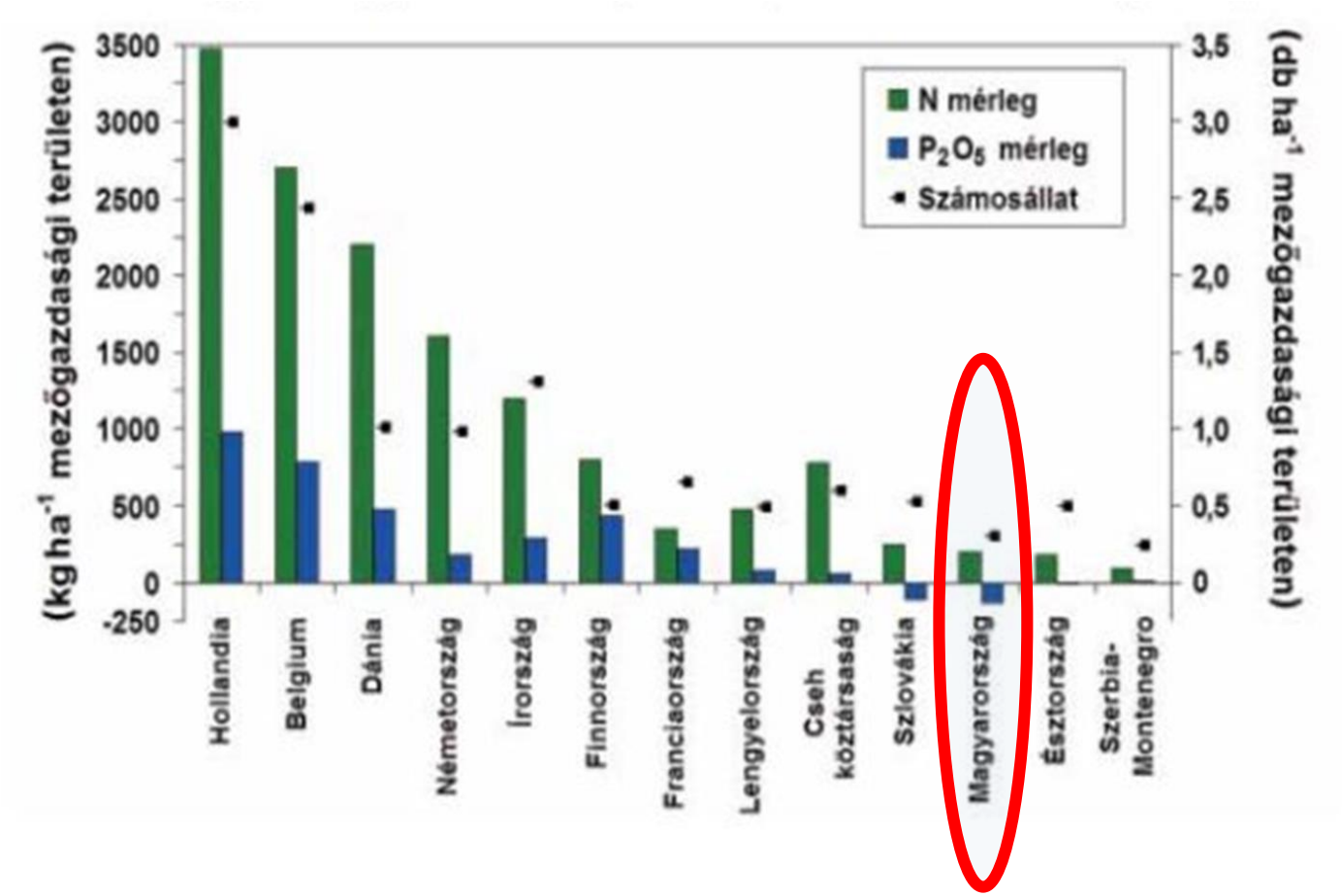
OUR WATER VISION

Organic matter replenishment



OUR WATER VISION

Organic matter replenishment



OUR WATER VISION

Water issues

- Continuous and accelerating decrease in ground watter level
  - Evaporation, transpiration
  - Irrigation
  - Groundwater flow towards river valleys.
- Long dry periods, increasing drought (ecological flexibility of the landscape is lost)
- Nitrate pollution in groundwater (fertilizers and pesticides)
- Damage by extreme precipitation (erosion, hail).

OUR WATER VISION

Stopping soil destruction

Coordinated organic matter and water management to restore the ecological functions of the soil (and landscape)

- Restoring soil fertility improves
  - Nutrient-providing ability
  - Water storage capacity
  - Pollution filtering capacity (via functioning biodiversity building a food network on organic matter)
- Varied and mosaic agro-ecosystems with regenerative approach (forest, pasture, orchard, arable land)
- Continuous soil surface coverage with living vegetation

OUR WATER VISION

Urban WW sludge

- High organic matter content: 60-85% (biomass responsible for treatment)
- Macro-, mezo-, és micro elements
- Colloid dimension, high water capacity
- Most nutrients inside cells, no washing out, elongated nutrient source
- With the 90 types of elements found in human nutrition, the ecological system can be restarted

OUR WATER VISION

Injection

- 4- 8 % dry m. sludge injected to 40-45 cm deep behind winged hoes, it forms a watertight layer, slowing evaporation and pollution towards groundwater,
- Fixes all properties of sandsoil (phisical, chemical, biological).
- On-site tests prove the lasting improvement of soil fertility.
- The use is subject to authorization.

OUR WATER VISION

Injection

OUR WATER VISION

Dewatered sludge

- Spread as fertilizer
- Working into soil immediately
- Needs authorization: 50/2001 Government Decree (on the rules for the agricultural use and treatment of wastewater and sewage sludge)

OUR WATER VISION

Dewatered sludge

OUR WATER VISION

Forestry research Results

Species: Acacia

- Control soil: sand
- 1.5 kg sludge mixed in the pot
- 3 kg sludge mixed in the pot

OUR WATER VISION

Forestry research Results

OUR WATER VISION

Forestry research Results

OUR WATER VISION

Obsatcles in sludge utilization

Decree 50/2001 allows usage w/ exclusion

- environmental condition e.g NO3 or NH4 content in groundwater
- Sand soil of large particles without colloids
- Prohibited in forestry due to its waste status

Fertilizers and pesticides are allowed in these areas

OUR WATER VISION

Municipal sewage sludge disposal 2015

(*) Belgium, Denmark, Greece, Spain, Cyprus, Lithuania, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom: 2012.
Italy: 2010. Croatia: not available.
Source: Eurostat (online data code: env_ww_spd)

OUR WATER VISION

Pine planting
on sand in a forest nursery

OUR WATER VISION

LET'S NOT WATER SEWAGE SLUDGE!

LET'S HEAL OUR SOIL!

- http://enfo.agt.bme.hu/drupal/sites/default/files/genetikus_fotipus_terkep_kicsi.jpg
- https://extensionarchitecture.co.uk/new-builds/soil-types-in-construction/
- https://promotions.hu/orszagos/tech-tudomany/2019/07/25/klimavaltozas-globalis-felmelegedes-felsivatag-magyarorszag
- Kalocsai et al. http://hidrologia.hu/vandorgyules/36/word/0203_kalocsai_renato.pdf
- https://mek.oszk.hu/02100/02185/html/304.html
- Megyes A: https://slideplayer.hu/slide/2108027/
- Csathó és Radimszky, 2007
- https://agraragazat.hu/hir/szantofoldi-injektalok-a-higtragya-talajba-juttatasahoz/
- https://www.youtube.com/watch?app=desktop&v=6rsPH9EjCZA&ab_channel=PetyaAgroTV