# Multiple NBS approach

NBS CASE

**The overall objective of the NBS test site in the largest semi-natural flood area in the entire Danube valley in Hungary is to develop and test innovative NBS practices and pathways that contribute to a socio-ecological transformation of existing intensive agriculture systems towards an increasingly sustainable nutrient management.**

Covering almost **36.500 ha**, **the Szigetköz** is the largest semi-natural flood area in the entire Danube valley today. The Szigetköz area has an exceptionally high ecological and landscape value even on a European scale. Despite previous human activities, all the landscape mosaics (and habitats) were still governed by the dominating dynamics arising from periodic and episodic floods with associated fluctuating levels of surface and groundwater. Besides the natural heritages an intensive agricultural production is also carried out in the Szigetköz region. The NBS site was set up at this natural agricultural location.

**The primary aim of the NBS site** to explore and evaluate the effectiveness of nature-based solutions (NBS) in agriculture, providing an alternative to conventional farming practices. The trial focuses on comparing NBS with traditional systems, assessing their efficiency, sustainability, and long-term viability.

These NBS systems include the introduction of **crop rotation** with a diverse selection of crops such as **durum wheat**, **sorghum**, and **soya**, which enhances **soil health** and **biodiversity**. The system also embraces **no-tillage farming** to preserve soil structure and reduce erosion, alongside the elimination of herbicides and the minimal use of pesticides to promote a healthier ecosystem.



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**Biobased fertilisers**, specifically poultry manure pellets, are utilised to enrich the soil naturally, while bio-stimulants, through the inoculation of microorganisms, further enhance soil fertility and plant growth. Additionally, cover crops are planted after wheat to provide natural mulching throughout the winter, contributing to soil protection and moisture retention.

Beside the trial, a critical part of the process involves closely monitoring the environmental and agricultural impacts of NBS to gain insights into their benefits and challenges. In addition, the development of advanced **monitoring and decision support systems** is a key objective, aimed at helping farmers effectively manage and implement these nature-based solutions. The trial also seeks to test the applicability of existing monitoring tools, refining them to better suit NBS practices.

## Challenges addressed by the NBS

- The improved crop rotation will have positive effects on soil Health, nutrient use efficiency, and combat pests and weeds.
- No tillage practices will reduce CO2 emissions/increase C-sequestration of the soil.
- No use of herbicides and minimal use of pesticides will increase biological soil activity and C-cycling.
- Using natural fertilizer (Poultry manure) instead of artificial will reduce the impact of imported mineral fertilisers.
- Bio-fertilisers increase crop productivity under environmental stress & Climate change.
- Mulching wheat over winter will increase C-sequestration and improve resilience to climate change.


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## Which biophysical, agronomic, and farm management implications does the NBS have at field and farm level?

- **Increased carbon sequestration** in agricultural soil which refers to the process of capturing atmospheric carbon dioxide (**$CO_2$**) and storing it in the soil as organic carbon. This practice not only helps in reducing the levels of greenhouse gases in the atmosphere but also improves soil health and fertility.
- **Reducing tillage** minimizes soil disturbance, maintaining more organic matter on the soil surface and promoting carbon storage.
- Growing **cover crops** during off-seasons provides continuous plant cover, which adds organic matter to the soil and enhances microbial activity.
- **Crop Rotation**, diversifying crops increases biomass and organic material inputs to the soil, which improves soil structure and carbon content.
- Adding **manure** also enriches the soil with organic material, boosting carbon storage and soil fertility.

## Which indicators/criteria are used to assess the success of the NBS in addressing the challenge?

**The success of the NBS in addressing its challenges is assessed using the following indicators/criteria:**

- Measuring the **amount of carbon dioxide absorbed** by soils as a result of NBS implementation.
- Monitoring the **amount of organic matter** incensement in soil
- Monitoring the **improvement in soil structure and soil biological activity**
- Monitoring the **health of the crops**

**These indicators provide a comprehensive assessment of the NBS's success in addressing its challenges.**


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## What methods/tools are used for the NBS assessment?

- **Soil sampling and analysis** with fast sensor-based technology
- **Plant sampling and analysis**
- Using **remote sensing technologies** for crop health monitoring: NDVI measurements, drones, satellite images
- **CO2 measurements**

## NBS site and scale


## Contact NBS team

**PISZTRANG KOR EGYESULET**
zoli@pisztrangkor.hu
Zoltán Fűzfa

**PANNON-MAG-AGRAR KFT**
pannonmag@gmail.com
Zsolt Kovács-Csomor
Veronika Rapp

**SZECHENYI EGYETEM**
ver.andras@sze.hu
Dr. András Vér

**trans4num** is a four-year project funded under the Zero Pollution call as an EU-China international cooperation action on nature-based solutions (NBS) for nutrient management in agriculture.
**trans4num ambition** is to broadly enhance the NBS implementation in Europe with an integrative and tested multi-level approach, in dialogue with academic partners, practice partners and societal stakeholders.

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