FINAL REPORT ON CHALLENGE #1:
Development of spectacular experimental and demonstration tools and content to establish and spread the use of NBS

Name of mentor(s): Zoltán FŰZFA and Katalin MIHOLICSNÉ ORBÁN

Number of participants:
25 secondary school pupils, 2 secondary school teachers, 3 agricultural researchers

INTRODUCTION

- ### Background of the challenge

PKE (Pisztráng Kör Egyesület / Trout Circle Association) is a civil organization with aim of environmental education, awereness rising in the content of sustainability. Among the roles of the PKE in the trans4num project, two tasks are linked to the Hackathon:
-Development of indoor and outdoor educational tools for awereness rising in the topic of NBS,
-Organising engagement meetings with farmers, experts, advisors, scientist in Szigetköz region.

Our team is working on a process of educational and demonstration tool development as part of the project. We are developing NBS HELP TOOLS - the NBS Mindset Toolkit. It will used by farmers, policymakers, pupils, students, interested visitors at events and educational programmes organised by us.

- Full explanation of the challenge defining the scope of the effort.

Short Description of the challenge

Create experimental tools and educational content to demonstrate the benefits of Nature-Based Solutions (NBS) in agriculture, focusing on ecosystem services, biodiversity, and soil health.

Extended description of the challenge

This challenge aims to develop innovative demonstration tools that highlight the impact of Nature-Based Solutions (NBS) on ecosystem services and biodiversity in agriculture. The tools will focus on soil health, with live earthworms used as biological indicators in many of the demonstrations. The project will involve developing a mobile "NBS Help Tools" interactive kit, featuring elements such as soil compaction testers, erosion simulations, and composting process tools. The kit will be designed to visually and practically educate users on the importance of NBS in sustainable farming, with the goal of promoting broader adoption of these practices.

Ambition of the challenge

The ambition is to create a comprehensive, mobile demonstration kit that can be used in educational and agricultural settings to showcase the real-world benefits of NBS. The tools will help farmers, students, and policymakers better understand how NBS interventions improve soil health and agricultural sustainability.

METHODOLOGY

- Team description + info about any coordination with other organizations, outside agencies

We had the opportunity to involve a class of Waldorf pupils and two of their teachers in the content development work. The pupils learn at the Son of the White Mare Waldorf High School in Nemesvámos, at the 10th grade, and spent a 10-day geography and nature conservation internship with us in the Fairy Island Ecopark in Dunasziget.

We spent 3 days out of the 10 days on the NBS topic, in which it was important for us to provide detailed and practice-based information on the concept of NBS. So we asked *István KULMÁNY* PhD, the head of the Agricultural and Food Research Centre at Széchenyi István University to present their NBS and conventionally cultivated areas. István and two research colleagues, *Dávid* and *Sándor* helped us to get experience with different tillage methods, cover plants, smart farming etc. in a half-day programme.

The collaborating institution and its researchers are:

István KULMÁNY PhD, Head of Agricultural and Food Research Centre
Dávid STENCINGER PhD, project coordinator
Sándor ZSEBŐ PhD, researcher
Széchenyi István University Albert Kázmér Faculty of Agricultural and Food Sciences in Mosonmagyaróvár, Department of Plant Sciences
https://mek.sze.hu/en_GB/research

- Technical Background

Our brand-new building, the Szigetköz Experience Centre and its surroundings, the Fairy Island Ecopark, was a perfect place to conduct the hacking and record the results. All the spaces and techniques related to the theme were used inside and outside the building: conference room, exhibition space, herb garden.
The NBS Help tools are integrated into our exhibition concept so that they can be activated and engaged at any time. For this purpose, we have mounted wheels on the tool cabinets.
www.pisztrangkor.hu
The professional agricultural science show was held on the Széchenyi István University's research area. The 400 ha-s educational farm of the Albert Kázmér Faculty is supervised by the Department of Plant Sciences where they first of all carry out research with special regard to the development of the production technology of cereals covering the testing of varieties, investigation of plant protection and soil management methods and fertilization experiments.
https://plant.sze.hu/en_GB/home

- Description of the process of solution

In preparation for Hacking we

- worked out the idea, discussed who the team members would be and who the other helping participants would be
- divided the tasks of the mentors: Zoltán to communicate and move the team, Katalin to photograph the process and provide information to students when needed
- have assessed the potential of the indoor and outdoor spaces related to our own territory

- visited the university demonstration site, met the experts and learned about the soil cultivation experiments. We explained our concept to the researchers and gave them free rein to run the session
- discussed the communication objectives, the time schedule and the hacking strategy
- bought the tools for the hacking: notebooks, digital photo frames, pendrives, paints, brushes, drawing paper, other graphic tools

During the Hacking we

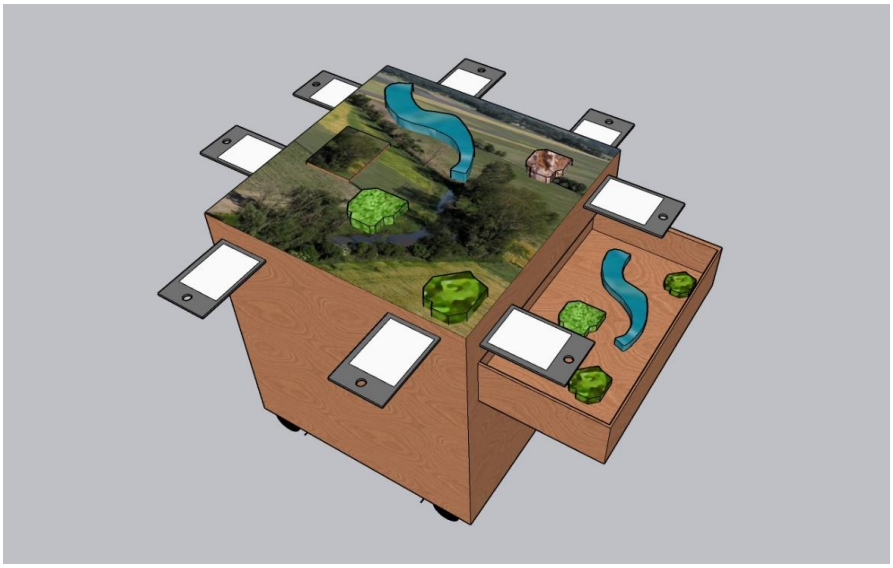
- showed the pupils the trans4num project and the NBS way of thinking
- talked about the trans4num inspired hackathon event and its general goals
- highlighted the goal of our own hacking process: to create educational content for observation and problem-solving tutorials on soil problems
- presented them the NBS HELP TOOLS concept, the development process and the concrete tools
- clarified the formal requirements for the content and asked them to form groups of 2-3 people according to their area of interest
- took them to the university's educational farm, where they took part in an interactive demonstration session
- discussed the experience with them
- helped them in the process of gathering and processing further information
- supported them in experimenting and brainstorming
- helped them put together tools and create educational content
- inspired the tool demonstration presentations
- recorded the process and results
- set further development targets

- Equipment list

In the NBS HELP TOOLS list, we discuss the problem-tracking tool and the experimental tools separately.

I. A tool for observation and problem raising:

Challenges in agriculture –Mock-up



a, The Mock-up shows a detail of an inter-island landscape, where events and experiences related to non-NBS farming are graphically depicted in 8 themes: e.g. a line of cars getting lost in a dust storm, a hunter suddenly sinking knee-deep into a freshly sown wheat field, etc.

b, The graphics are explained by the story descriptions:

Short stories for each situation can be read on the worksheets.

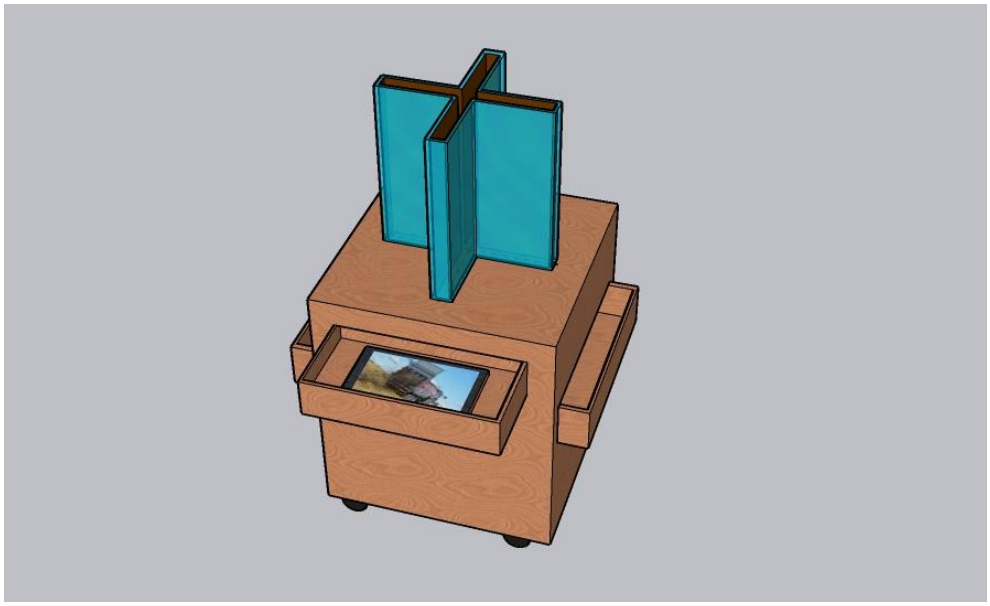
c, After the observer reads a half-minute mini-story related to each of the graphics displayed on the mock-up, he/she moves on to the soil testing presentation elements and their associated informational content.

The last sentence of the text always guides the investigator towards the next step.

d, Attachable mock-up elements: in the drawers you will find NBS examples, which are attachable mock-up elements e.g. bush rows, ground cover planted area, direct seeder, etc. These can be used to modify the landscape and the way of cultivation.

II. Investigation, analysis, NBS exercise toolkit:

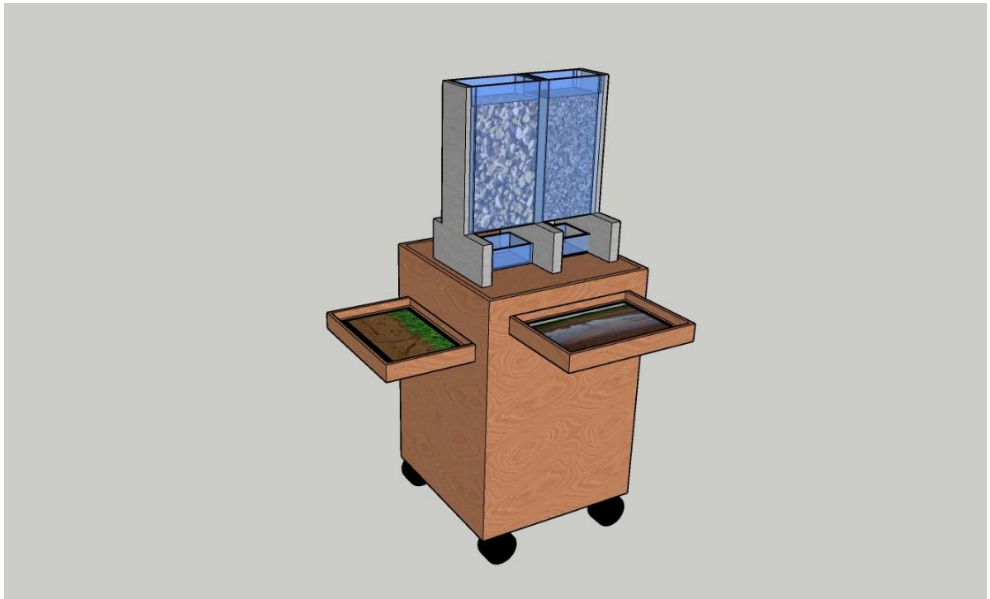
1. A tool to show the relationship between soil life and different levels of chemistry



Which soil does the worm thrive in? (four different soil samples, from heavily chemicalised to chemical-free, in the star-shaped jar)

NBS information: Optimised pesticide and fertiliser use, reduced environmental impact

2. The Soil Water Holding and Permeability Test



Observe the path of water in loose and compacted soil!

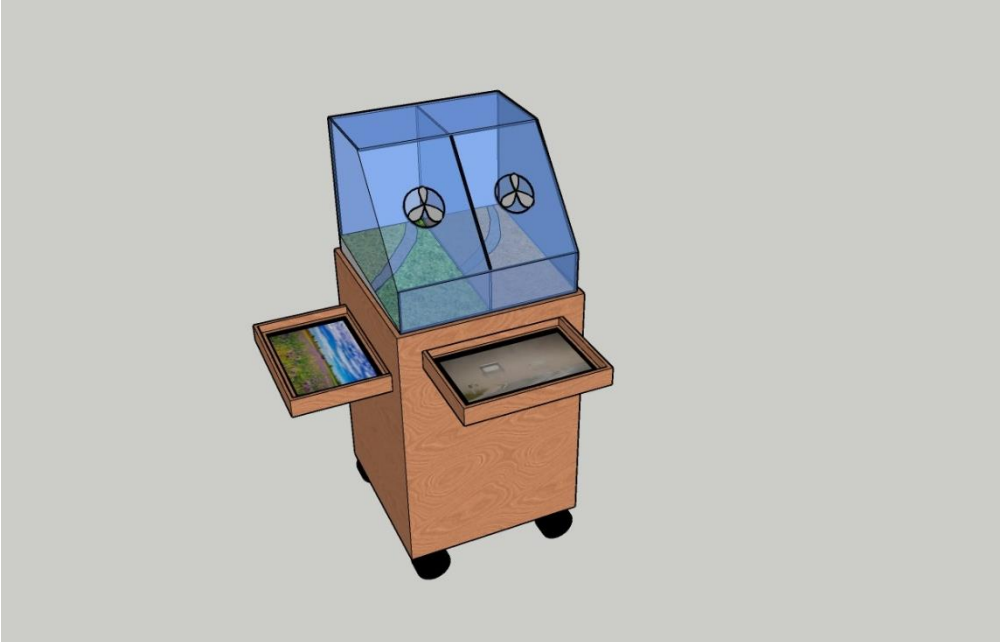
NBS information: soil regeneration, natural soil fertility and a good soil structure

3. The Soil Compaction Tester

Observe the development of plants in loose and compacted soil!

NBS information: Soil renewal, no-till, min-till, natural soil fertility and a good soil structure

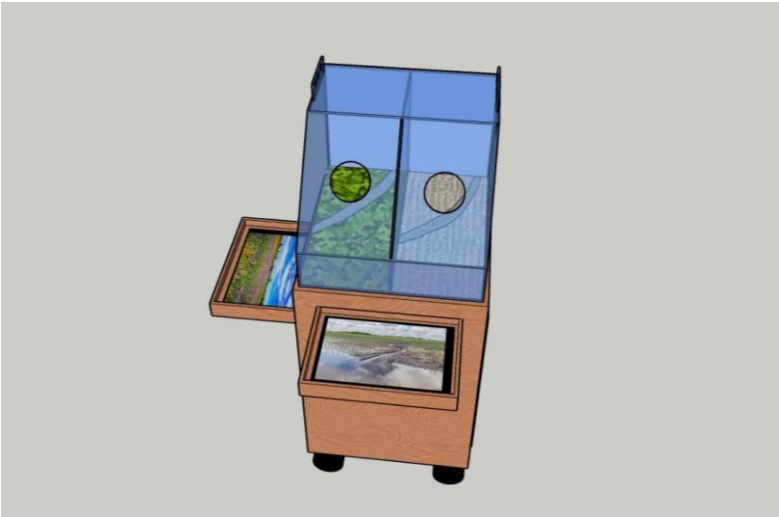
4. The Wind Effect Tool



Observe the effect of the wind on soil covered with plants and soil left free!

NBS information: cultivation of cover crops and integrating trees within cultivated land

5. The Soil Erosion Test Tool



What happens during prolonged rainfall in differently cultivated soils! Get some rain with the sprinkler on both sides!

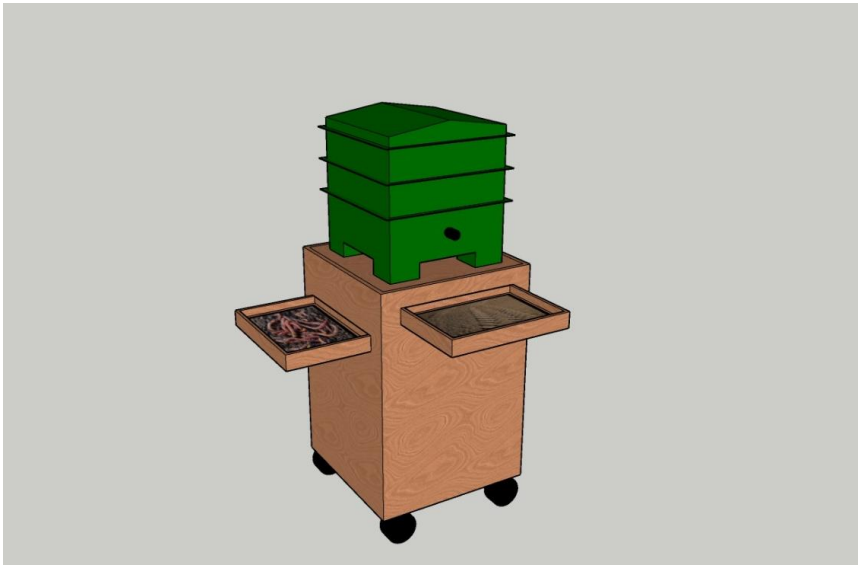
NBS information: Nature-based solutions can help farmers adapt and ensure food production is more resilient to future weather extremes like droughts, heavy storms, or coastal flooding by enhancing soil health and water retention, reducing soil erosion

6. The Soil Cover Crops Tool + Crop Rotation theme

Watch out for cover crops and learn about their uses!

NBS information: in empty beds and fields, we sow fast-growing cover crops that are rotated into the soil to improve soil water balance and nutrient content.

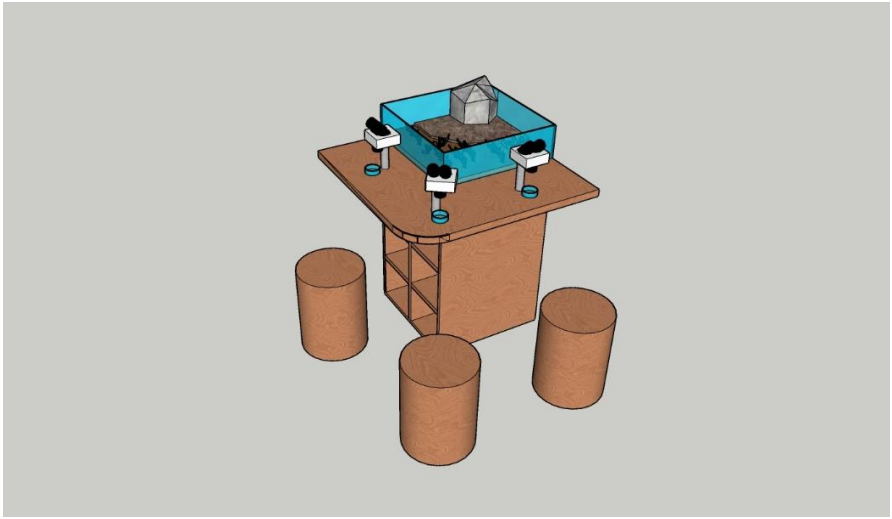
7. Composting process demonstration tool



Watch the worms at work!

NBS information: By using compost and plant residues left in the field, you will gain valuable materials, save energy and protect the environment.

8. A model of the soil formation process and the Soil-dwelling microscopic organisms tool



- Detailed implementation plan

Phase 1 (1 month)

- Preparation for Hacking (idea, location, date, time scedule, tools)
- Team selection, prior communication with the secondary school teachers
- Meeting with researchers from the university's educational farm
- Divide the tasks of the mentors

Phase 2 (1/2 day)

- Informing pupils about the trans4num inspired hackathon event and its general goals
- Show the pupils the trans4num project and the NBS way of thinking
- Show the idea behind the **NBS HELP TOOLS**
- Present them the NBS HELP TOOLS development process and the concrete tools
- Set the goal and clarify the formal requirements of the content
- Ask pupils to form groups of 2-3 people according to their area of interest

Phase 3 (1/2 day)

- Visit the university‘s demonstration site with pupils, meet the experts and learn about the soil cultivation experiments
- Discusse the experience with them

Phase 4 (1 day)

- Help the pupils in the process of gathering and processing further information
- Support them in experimenting and brainstorming
- Help them put together tools and create educational content
- Inspire the tool demonstration presentations
- Record the process and results

Phase 5 (1/2 day)

- Record the demonstrations of teams
- Record the process and results
- Set further development targets

- Analysis of needs of stakeholder groups

During our trans4num events, we regularly talk to farmers, consultants and environmental experts. Most of them agree that information about regenerative agriculture is not clear. The issue is very multi-dimensional and there are few solid practical examples to help them make decisions.
They are interested in nature-based solutions, but it is becoming increasingly clear that everyone needs to experiment with their own best practice, which requires a constant openness, observation, drawing conclusions and a willingness to take risks.
The other target group who will use the tools are pupils, students. Our many years of experience of teaching them and the behaviour we have observed during hacking is that young people's life experience is very far from agricultural production and knowledge of nature in general. However, if they are given the basic information and a framework story that can be interpreted in terms of their experiences, they will actively participate in exploring the problems and finding solutions. Both target groups are helped by the NBS HELP TOOLS to explore the connections and to develop a consistent, experimental mindset.

- Experimental results

1. The tools have educational content
2. Project method was experienced
3. Authentic learning: We brought real-world to the classroom, took the class out into the world
4. Creative design and implementation completed
5. Both students and mentors learned by doing a lot both about the topic and about cooperation

FINDINGS & CONCLUSION

- Discussion of the results and findings

Understanding and visualizing the benefits of NBS in a practical, educational context is essential to encourage widespread adoption. This challenge focused on creating educational tools that simplify the complex interactions of NBS, helping to spread their use in agriculture.

After providing basic agricultural and environmental information, the students worked enthusiastically and creatively to set up the tools, set up the experiments and create the educational materials. The wealth of information available on the Internet was a great help, but it also became a challenge, as it is not easy to find valuable and useful information among the many articles on all kinds of agricultural topics.

Our experience is that students in Waldorf schools find it easier to connect with nature, they find the connection to nature conservation sooner. The middle school age group is already open-minded and well-educated enough to formulate textual and graphic content in a comprehensible manner. Therefore, they have proven to be extremely good partners in device development.

- Further improvements

The further key issue in NBS HELP TOOL development is to create stories that are both professional and easy to understand to raise problems, e.g. a road accident that makes the problem of wind erosion understandable to anyone.

If we can find the right understandable introductory story to the problems, the next step is how we can move the thinking from the story to the agricultural issues.

The tools are not just about posing problems, but also about moving towards problem-solving thinking and outlining a positive vision for the future, with man and nature working together.