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Good examples of soil education for youth to increase soil literacy

Christina Lundström, Swedish University of Agricultural Sciences
Elin Wärm, Swedish University of Agricultural Sciences
Margherita Caggiano, Re Soil Foundation, Italy
Mayte Gallego, FUNDECYT-PCTEX, Spain
2025-05-02

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This version is based on the original report available on Zenodo: Lundström, E. C., Wärm, E., Mayte, G., Smreczak, B., & Caggiano, M. (2025). Good examples of soil education for youth to increase soil literacy (Version 2). Zenodo.
DOI: https://doi.org/10.5281/zenodo.14620581

Publishing year: 2025, Uppsala
Publisher: Department of Soil and Environment, SLU
DOI: https://doi.org/10.54612/a.2bqc5135bc
ISBN electronic version: 978-91-8046-549-6
Layout: Elin Wärm

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Summary

One of eight aims of the EU Mission Soil, is to increase soil literacy in society. One way to do that would be to reach out to teachers and inspire them to involve soil topics in their teaching. Therefore PREPSOIL Task 6.2 aimed to identify good examples of soil education and learning activities for youth and communicate them with teachers and pedagogic representatives across Europe. During 2023 and 2024 teachers were invited to share their good examples on soil education targeting primary, secondary and vocational training pupils. A committee which consisted of three teachers, one soil scientist and one pedagogy actor selected winners and runners up from selected finalists. All in all, the two calls received more than 50 submissions, with a broad range of examples of natural, urban and agricultural soils in interdisciplinary learning (science, humanities, etc) using multiple senses. We conclude that a lot of interesting and inspiring pedagogy work concerning soils are happening in Europe! The challenge to reach the intended teachers to share their work proved to a challenge, despite reaching through known networks and channels at national pedagogic and teacher contact points. Knowledge about the national school context and cooperation with well-known and reputable actors, whose communication channels as well as communication in national language can help promotion and sharing of good teaching examples across Europe.

Key words: Soil pedagogy, Soil literacy; primary and secondary teaching, Mission Soil

Introduction

Soil is essential for life on earth. It is a natural resource that provides life supporting ecosystem services like cleaning water and providing food. After oceans, soil is the largest carbon sink and is therefore key for strengthening resilience to climate change (EEA 2023). However, soil is a natural resource often taken for granted and we often neglect the importance of soil to our society. Our food, material like lumber for building houses and cotton for making clothes, as well as recreation activities in nature, all originates from soil.

One centimetre of soil can take hundreds of years to form, but can be lost in just a single rainstorm or industrial incident. (Mission soil)

Mission soil and soil literacy in society

The value of soil and how it provides for the well-being of humans, other species and planet Earth is often unacknowledged, which contributes to soil degradation. Hence, improved soil literacy is key to prevent degradation of soil (EU Soil Observatory).
EU's main funding programme for research and innovation is Horizon Europe. Within the programme, five missions are a new element. The missions provide "sets of measures to achieve bold, inspirational and measurable goals within a set timeframe" (Horizon Europe). Mission Soil is established within this programme and soil health is considered a major societal challenge by EU. "The main goal of the Mission 'A Soil Deal for Europe' is to establish 100 living labs and lighthouses to lead the transition towards healthy soils by 2030" (Mission Soil). Living labs are regional partnershipsbetween actors across different sectors – academia, industry, public sector and citizens – aiming to develop solutions for wicked and complex problems. In soil health living labs, diverse actors like researchers, farmers, foresters, spatial planners, land managers, and citizen's work on solving soil issues related to the Mission Soil objectives:

1. reduce desertification
2. conserve soil organic carbon stocks
3. stop soil sealing and increase re-use of urban soils
4. reduce soil pollution and enhance restoration
5. prevent erosion
6. improve soil structure to enhance soil biodiversity
7. reduce the EU global footprint on soils
8. improve soil literacy in society (Mission Soil).

PREPSOIL project

By creating awareness and knowledge about soil among diverse stakeholders across Europe PREPSOIL facilitates the implementation of Mission Soil. One of the main goals with the project is to increase understanding and implementation of Living Labs in relation to soil health. Improved soil literacy and increased communication to create engagement are essential activities in the project as well. On the PREPSOIL website you find a one-stop-shop for soil literacy, communication and engagement (PREPSOIL).

Task 6.2

As part of achieving the eight objectives set by Mission Soil, PREPSOIL task 6.2 will identify, promote and reward innovative examples of soil health education for young people. Participants from six countries Italy, The Netherland, Norway, Poland, Spain and Sweden have collected and compared good examples of soil education targeting primary, secondary and vocational training pupils. An Award Committee should select the best practices each year (2023 and 2024).

Purpose and aims

The purpose of this task was to inspire teachers to work with soil issues and thus increase soil literacy in society among youth, focusing on primary, secondary and vocational training schools. The aim was to identify, promote and reward innovative examples of soil health education for young people in order to inspire teachers around Europe to work with soils together with their pupils. The task will result in i) a publication of winners and finalists on the PREPSOIL website, 2) notification and rewarding of the applicants who sent in good examples on soil pedagogy from 2023 and 2024, and ii) webinars in national school contexts with the winners and runners up from the countries that participated in PREPSOIL Task 6.2; Italy, The Netherlands, Norway, Poland, Spain and Sweden or other contributing country.

Method

A process of two calls for best teaching examples were implemented during PREPSOIL project month Sep 2022 to May 2024. Both years it was possible to apply in task participant's native language as well as in English. The reason was that the task members translated the applications to English themselves.

Call 2023

The participants in Task 6.2 first met in Århus, Denmark, in September 2022 at the PREPSOIL Kick-Off meeting. During October 2022 SLU developed a strategy for how the task would be performed. In order to reach out to teachers in the different countries each participant should get in contact with some kind of national or regional pedagogy actor to cooperate with. The thought was to use their communication channels to teachers since very few teachers were supposed to find information about the call for good pedagogy soil examples unassisted at PREPSOILs website. The strategy was discussed and further developed at a meeting on the second of November 2022. During November a template for the call was developed in English and translated to the participating partners' native languages, i.e. Norwegian, Polish, Spanish, Italian, Dutch and Swedish. Trust-IT was involved, developed the call texts in native languages to use in each country advertisement actions for web interface and social media of PREPSOIL. The call was also published in English on the PREPSOIL website. Every country was encouraged to reach out to respective national pedagogic contact points and use their communication channels in order to reach out to the target group of primary and secondary schools and teachers for the call. On the 25th of January 2024 the call was closed. The Task group appointed a committee for assessment of submitted best teaching

Figure 1. The call advertisement from 2023.

examples consisting of a soil researcher (NL), a primary school teacher (NO), a secondary school teacher (IT), a vocational training teacher (ES) and a pedagogy national contact point (SE). SLU developed instructions for application as well as criteria for selection of finalists as well as winners. Both the instructions (Appendix 1) and the criteria (Appendix 2) were presented to the participants in the Task at a meeting and then adapted due to suggestions of improvements. The most important criteria was probably that we did not ask for simply a book, a software, a webpage or such. Instead we searched for activities, teachers doing something with their pupils. Three of the PREPSOIL task partners' participants (the representatives from Sweden, Italy and Spain) did a pre-screening of the 45 applications according to the application instructions first and then the criteria, approved 19 submissions and selected ten finalists that were sent to the committee. The committee then selected one winner and two runners up. The selection of ten finalists was done to limit the work for the committee. On the 23rd of March 2023 the committee made their decisions. The winner and the two runners up came from Austria, Italy and Sweden. The winners got diplomas and were published as winners on the PREPSOIL website.

Call 2024

In 2024 the second call for good teaching examples opened in November 2023 and closed 29th January 2024. The description of the call can be found here: Soil Pupils | Prepsoil
In total, there were twelve submissions, but one was not approved, due to incomplete information. Eleven applications were sent to the Committee. The Task group appointed a committee for assessment of submitted best teaching examples consisting of a soil researcher (NL), a primary school teacher (NO), a secondary school teacher (PO), a vocational training teacher (ES) and a pedagogy national contact point (SE). Poland invited a secondary school teacher instead of Italy. In Sweden and Spain new persons, still representing the same category, were participating. The committee were provided with an extended instruction to select two winners from primary school, and two winners from secondary school or vocational training (Appendix 3), since the committee from the first call thought it was difficult to compare very different pedagogical arrangements for different ages of pupils.

Figure 2. The call advertisement from 2024.

Communication to teachers – strategies to reach the target group for the call

The Task 6.2 were faced with the challenge of reaching a partly new target group, i.e. primary, secondary and vocational schools and teachers and therefore spent considerable effort in developing nationally appropriate and suitable communication channels. The main strategy was to use every Task participant's own communication channels in combination with the use of a national pedagogy contact point with existing developed communication channels and professional networks. All participants used their own website and social media as Facebook and LinkedIn etc. In addition, others used different kinds of soil associations or national soil conferences.

In Sweden, the Swedish Centre for School Biology (About us - Nationellt resurscentrum för biologiundervisning (uu.se)) advertised the call in their newsletter, which reach all biology teachers

in Sweden from pre-school to secondary school as well as adult education. In addition, the call was announced on a science teacher Facebook group an in a network on vocational training schools.

In Italy, Re Soil Foundation (Re Soil Foundation | Regeneration for clean and healthy soil.) promoted the call by using its website, social media and newsletter,which reach over 1,600 teachers. In some countries Facebook groups for biology teachers were used for communication of the call. In Poland, 69 agricultural secondary schools, received a message concerning the announcement for the call. In the Netherlands, the Wageningen University in-house team, who works with teachers at primary and secondary schools, was contacted. The call was spread through their newsletter as well as social media. The participant from the Netherland also contacted a science teachers' organization in Belgium and asked them to share the information regarding the call with their teachers.

The participant from Spain, FUNDACION FUNDECYT (.::FUNDECYT PARQUE CIENTÍFICO Y TECNOLÓGICO DE EXTREMADURA ::. – Fundación del sector público autonómico de Extremadura, sin ánimo de lucro, con un objetivo fundamental: la vertebración del Sistema Extremeño de Ciencia y Tecnología (fundecyt-pctex.es)), acts as nexus between the regional government, the university/ educational centres, the private sector and society in general. From this position, and related to task 6.2, FUNDECYT-PCTEX directly contacted different institutions and educational centres in the region in order to identify good teaching practices. In Oslo, the municipality supports a network of school gardens, which was contacted by the researcher from NIBIO. The network Eriaff (Eriaff | Eriaff) was contacted by the Spanish team. Other Mission Soil projects were contacted by participants in the task, such as NATIOONS, HuMUS and LOESS. Those projects are ongoing and not yet reported.

Ethical considerations

All data that was sent in from teachers and schools are handled in accordance with the data protection laws and policies (GDPR). The applicants had to accept that both texts and images could be published on the PREPSOIL website before they were able to upload an application. The information on PREPSOIL website will be stored during PRESOIL project time and follow other post project guidance. All information that are downloaded locally by the Task participants, will be removed when the project is finished. However, before that all data could be accessed by all participants in PREPSOIL since it is published on PREPSOIL share point. For this data, the project leadership is responsible. The report will be communicated and possible to down load at the PREPSOIL website.

The committee that made decisions concerning winners and runners up consisted of one man and four women in 2023 and three men and two women in 2024. We have not made any evaluation concerning gender aspects of the applicants, since it was optional to make an application and the task was not explicitly aiming for gender or age balance in the calls of best examples. All in all the two calls got 57 applications. A majority of the applicants came from Italy. Among the finalists there were eleven applicants from Italy, four from Spain, two from Hungary and finally one from Austria, Ireland, Poland and Sweden.

Results

In this section a short description of the winners and finalists from 2023 and 2024 are presented. More information about each example could be found on the PREPSOIL website: Best Teaching Practices | Prepsoil

2023 winners

Figure 3. Diplomas to the winner and the two runners up from the call 2023.

The winner: Raising soil awareness among Austrian pupils and students – Austria

Figure 4. Images from the winning Austrian example in 2023.

Through several activities arranged by The Austrian Soil Science Society, pupils were introduced to soil. A series of workshops let children between nine and thirteen explore soil through four stations where they identified animals living in soil, conduct scientific experiments and put their hands into soils. The experiments included a filter experiment, observations through microscope and definition of soil texture by touching the soil. By touching, watching, smelling and even listening, pupils used almost all their senses to observe soil. At least fifteen workshops were held per year in Vienna.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Vienna, Austria
School: Environment Agency Austria and more (see text on: Best Teaching Practices | Prepsoil)
Teacher: Barbara Birli
Age of pupils: 9-13 years

The first runner up: Carbon cycle soil and biodiversity – Italy

Figure 5. Images from pupils working in the project Carbon cycle soil and biodiversity.

The aim of this project was to support Agenda 2030 and raise awareness about soil. In a science lab, the students discussed geospheres, focusing on the lithosphere and in particular the soil. The students learned about the mechanisms that regulate the carbon cycle, and the effects on biodiversity due to its alterations that alter soil fertility. The activities included sowing seeds in different soil and climate conditions to explore which conditions the plant prefers, laboratory analysis to detect active and inorganic carbon, and observation of microbiome in soil and compost through an optical microscope. The activity was designed for fourteen to sixteen year olds.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Foligno (Perugia), Italy
School: Liceo Scientifico e Artistico G Marconi
Teacher: Stefania Minelli
Age of pupils: 15-16 years

The second runner up: The vital soil – Sweden

Figure 6. The earth's surface as a circle. How can the area be divided? What proportion is arable land? The vital soil from Sweden.

The Nature School in Lund provided pupils the opportunity to investigate outdoor education in the schoolyard, in a park, school garden or any other natural area in proximity to the school. In the activity, the pupils delineated a circle on the ground for observation. Together with the teacher, the pupils discussed what the earth's surface consisted of and then they were divided into pairs to talk about:

- What do you think when you see that there is such a small area that can be cultivated?
- What feelings do you get when you see how little space it is actually possible to grow food on?
- How should we use this part of the earth wisely?
- How can we use the schoolyard or an allotment that we have access to, knowing this?

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Lund, Sweden
School: Naturskolan
Teacher: Carolina Lindeblad
Age of pupils: 14-16 years

2023 finalists without ranking

Earth, Earth, Earth – Italy

Figure 7. The vegetable garden in the project Earth, Earth, Earth from Italy.

A vegetable garden was central for the activities carried out in this project. Children between six and thirteen years old were invited to interact with soil using different senses in activities like sowing, observing growth as well as making and using compost. The garden was also used for being creative through soil by using it for painting (inspired by Richard Long) and listening to Chiara Carminati's poetry and soundtrack. The purpose of the activities were many, but some related to culture through exploring generational expressions and to safeguard traditions as well as personal growth through engaging in group work and taking care of younger. Additionally, by discussing food safety and understanding the origin of certain medicines and the use of herbalism, health was an important theme.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Empoli (Tuscany), Italy
School: Istituto Comprensivo Empoli Est
Teacher: Rossella Dei
Age of pupils: 6-13 years

Learning in the open air – Spain

Because the connections to soil and agriculture are decreasing, the aim of this initiative was to promote awareness and offer practical activities with soils for pupils. The pupils were involved in several gardening activities – from preparing the land by removing weeds and setting up irrigation systems, sowing and caring for the plants, to harvest. Besides the more traditional and practical activities, the aim of the initiative was to create a deeper bond to the environment and nature. The pupils learned about healthy living habits and to care for the environment while connecting with people in different ages.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Badajoz, Spain
School: CEIP LOS GLACIS (Los Gladis Nursery and Primary School)
Teacher: Juan Luis Martínez Larios
Age of pupils: secondary school

Soil consumption – Italy

This initiative was part of a bigger project about active citizenship. Pupils in the age of fifteen and sixteen were introduced to the soil theme on a global level through Uli Henrik Streckenbach's movie Let's talk about soil. Soil was discussed at a general level and the diverse and complex challenges related to soil were considered. To explore the topic on a national level, the students read the report Soil Consumption, Land Use Dynamics and Ecosystem Services by the National System for Environmental Protection. After analysing the report, the students discussed the following questions with each other:

- Why should soil be preserved and not consumed?
- What are the consequences of soil consumption on climate change?
- What does the 2030 Agenda say about soil consumption?
- According to the ISPRA 2022 report, what is soil consumption in Italy due to and how has it evolved? Which areas of the country are most affected?

Through group work, the pupils were working on land consumption in their municipality. The work was guided by the following questions:
• What changes has the landscape in your municipality undergone in the last 10 years?
• What has happened to the soil in your municipality?
• What socio-economic phenomena do you think have contributed to soil consumption?
The last task was to create a poster on the theme of protecting soil in the area by suggesting strategies to be adopted.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Vasto (Chieti), Italy
School: Polo Liceale Statale "Mattioli"
Teacher: Giuseppina Addeo
Age of pupils: 15-16 years

Open School for Open Societies (OSOS) – Italy

Figure 8. Pupils working together in the Open School for Open Society from Italy.

The aim of the project was to raise awareness about environmental issues, organic farming and the consumption of seasonal and zero-km products. The main activity of this project was for students in the age of eleven to fourteen to grow vegetables organically in wood boxes, which they brought home to cook when the vegetables were harvested. The school also celebrated a tree festival on the 21st November by planting trees in the school garden, and the World Bee Day on the 20th May by planting bee-friendly plants in the schoolyard and around their car park.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Merlara (Padova), Italy
School: IC "Comuni della Sculdascia". Scuola secondaria di MERLARA
Teacher: Mariapia Borghesan
Age of pupils: 11-14 years

Urban vegetable gardens – Spain

This was a joint project between the Manuel Pacheco Public School and the Urban Vegetable Garden, where children in the age of one to eleven and elders worked together in the garden which is located in a neighbourhood of Badajoz, Spain. The children prepared the soil and performed activities like weeding, seeding, and harvesting together. After harvest, a barter market was organised at the school. Children brought non-perishable products to exchange for fresh vegetables and fruits. The non-perishable products were later distributed as charity among disadvantaged people as part of a social movement of support and improvement of this marginal neighbourhood and the families living there. The aim of this activity was to encourage healthy living habits.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Badajoz, Spain
School: JOINT INITIATIVE Platform Urban Vegetable Gardens & Manuel Pacheco Public School
Teacher: Fernando Gonsalbes (Huertos Urbanos) and Rocío Macarro (Manuel Pacheco PS)
Age of pupils: 1-11 years

Soil zoology: Unrealistic soil living macro organisms – Hungary

On a wall, 20 pictures of animals living in the soil and other bigger animals was presented. Most students had not seen these animals before, and some of them looked like aliens. Among all pictures, there were two animals with information about them who were not real, and the task was to find out which two it was. The aim was to increase awareness of soil organisms by giving information about the existing ones, even if the task was to figure out which two were fake.

For further information, please visit Best Teaching Practices | Prepsoil

Figure 9. Soil zoology: Unrealistic soil living macro organisms.

Based in: Budapest, Hungary
School: Centre for Agricultural Research, Institute for Soil Sciences (CAR ISS)
Teacher: Norbert FLÓRIÁN
Age of pupils: 13-15 years

Soil degradation: erosion by water – Hungary

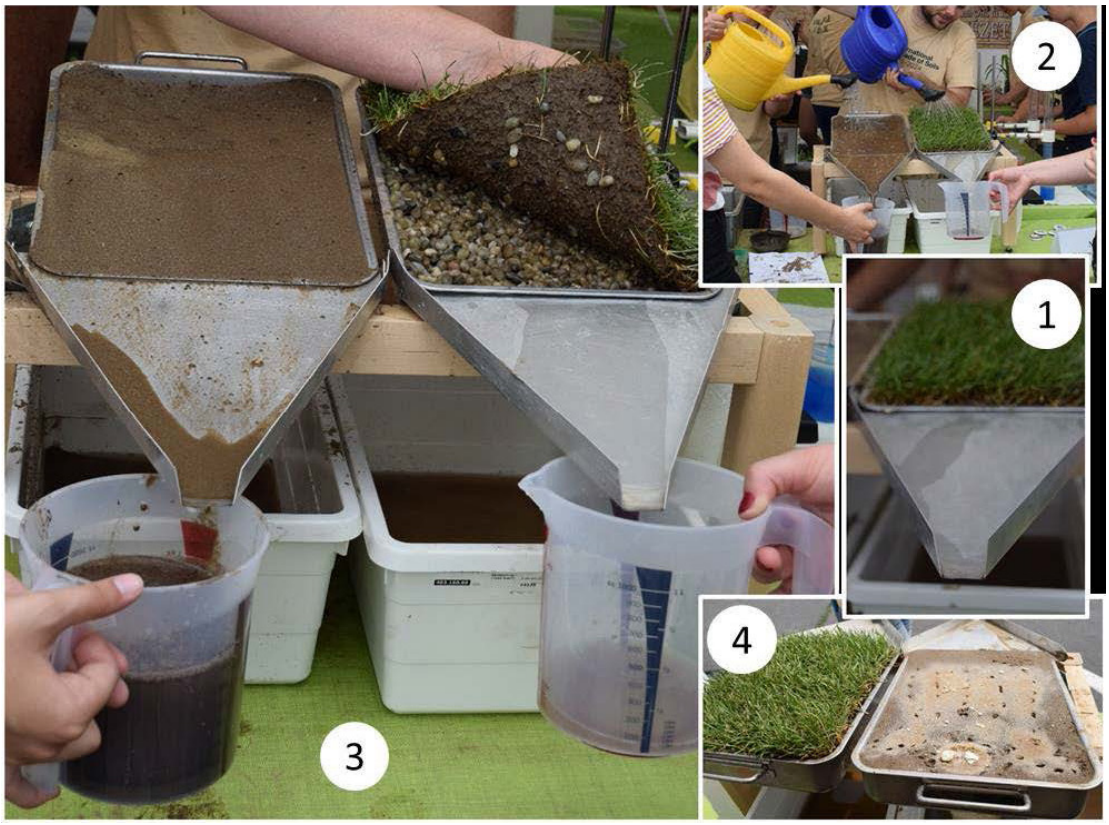

Figure 10. Images from pupils working with soil degradation in a Hungarian project.

Rainfall on bare soil and soil covered in grass affects the soil differently. In this experiment students demonstrated the differences in runoff water and how the water infiltrated the soil by watering two different surfaces – one covered in grass and one with bare soil.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Budapest, Hungary
School: Centre for Agricultural Research, Institute for Soil Sciences (CAR ISS)
Teacher: Zsófia Bakacsi
Age of pupils: 13-15 years

2024 winners

Figure 11. Diplomas for the two winners and the two runners up from the call 2024.

In this section a short descriptions of the winners and finalists from 2024 is provided. Each applicant indicated for which ages the pedagogy example was suitable. In the second call six of the applicants aimed at the older category of pupils (secondary or vocational school pupils), two aimed at primary school children and three aimed at all ages. In the selection by the committee, they followed the recommendations from the applicants. Accordingly, some applications competed in both categories. The four winners came from Ireland and Italy. The Irish application addressed all ages, but won in the chategory for primary school. The winner in the secondary and vocational training school chategory as well as the two runners up, came from italy.

For further information, please visit Best Teaching Practices | Prepsoil

Primary school winner: Love Your Wellies – Ireland


Figure 12. Images from the Irish project, Love your wellies.

In this initiative, art was used to raise awareness about the value of peat landscape. FarmPEAT held an art competition and invited children from primary school to sixth grade to submit an art medium according to four themes; environment, farming, community and history. The format of the art medium could be a model, literary, artistic or digital. A limited number of workshops were offered during the competition to participating schools to help guide students as they developed their ideas. There are prices, and the 1st, 2nd, and 3rd Places are rewarded. The highest amount is €250 per student, or €1000 if group entry. Young people are targeted as they are the farmers, decision-makers, policy-makers, community members, and land-owners of the future.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Westmeath, Ireland
School: FarmPeat project
Teacher: Katie Smirnova
Age of pupils: 6-18 years

Primary school runner up: The soil to educate – Italy

Figure 13. Images from the Italian winner, The soil to educate.

The purpose of the activities in this project was to approach soil in early ages and create awareness on its importance to sustain life on earth. Because of the lack of focus on soil in the curricula, the risk is that students miss to see soil as a living resource we must care for. The project was designed for six to ten year olds and divided into four steps. The first step was about the origins of food where chocolate and cocoa were used as examples to discuss diversity of food in the world, why some foods can be produced locally and others must be imported. In the second step, the students met with a local farmer. The students looked at different plant families and grain plants typical to the mountain area, and the development from seed to plant was in focus. The third step was about soil as a system and the ecosystem services it provides. Through a theatre about a soil worm, they explored soil and how the earth worm's life was impacted by challenges like erosion and deforestation. In the last step, nations and their resources were explored through a simulation game. Problems and sustainable growth were in focus on a global scale. Chocolate was used as an example again, and the aim was for students to know the origin of some resources to produce chocolate, the production conditions, and to identify a country with which their country has trade.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Brunico, Bolzano, Italy
School: Istituto Pluricomprensivo Brunico
Teacher: Erika Guerrini
Age of pupils: 6-10 years

Secondary school / vocational training winner: Economy is a wheel – Italy

Figure 14. The winner: Economy is the wheel from Italy.

The school garden, Apitour, engaged the whole school community in the project Economy is a wheel. The theme of the project was reusing and recycling materials, and the need to change our habits to create a fair world. 60 secondary school students were involved in the first phase which includes creating a blog, setting up a garden and to create artefacts of recycled materials. In the second phase, the same pupils who were engaged in the first phase became tutors for 300 pupils in the age of eleven to thirteen and used their accumulated experiences and skills to involve the younger students in the circularity of the project. The topic of soil was discussed in terms of exploitation for mineral exploration, agriculture, livestock farming, construction and transport. During the project, students engaged in activities on e.g. how to take care of plants, how to make compost and how to sustainably use water resources.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Cimitile, Napoli, Italy
School: Adele Martiniello
Teacher: I.C. Fratelli Mercogliano-Guadagni
Age of pupils: 11-13 years

Secondary school/vocational training runner up: World Soil Day – Italy

Figure 15. The runner up: World Soil Day from Italy.

The priority of this project was to raise awareness and actively involve students in topics about soil and environment. Fourteen to sixteen year olds designed a series of activities to introduce their classmates to environmental construction, land use and geopedology. The aim was to give the students an understanding of the complexity of soil as a system and the many approaches to study and work with soil. The activities covered the topics of:

- Soil and climate change
- Naturalistic engineering
- Soil analysis
- The intelligence of the soil
- Soil ecosystem
- Soil fertility.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Torino, Italy
School: Martino Noce
Teacher: IIS Russell Moro Guarini Torino sede Guarini
Age of pupils: 14-16 years

2024 finalists without ranking

The School Soil Laboratory, Glebowe – Poland

Figure 16. The School Soil Laboratory, Glebowe from Poland.

The School Soil Laboratory allowed young people to learn about the methods of laboratory work, take an in-depth look at soil relationships, and perform tests in a responsible environment and manner. By testing pH, mineral nitrogen, phosphorus and potassium levels in soil, the students could help to provide valuable insights into the current state of soil. They worked in small groups and carried out tests based on developed laboratory procedures on samples provided by farmers. The students emailed the farmer once the results were ready and provided fertilization and cultivation tips as well. The students carried out this activity in their free time since it is not integrated in the regular teaching time.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Wielkopolska, Poland
School: ZESPÓŁ SZKÓŁ OGÓLNOKSZTAŁCĄCYCH I ZAWODOWYCH W ZAGÓROWIE
Teacher: Iwona Wilczyńska-Kałużna
Age of pupils: + 15 years

Andalhuerto Ecological Project – Spain

Figure 17. The Andalhuerto Ecological Project from Spain.

This project directly involved schools and pupils in the age of three to sixteen years old in the region of Andalucia, in the field of organic orchards to promote biodiversity, self-sufficiency and soil care. The project offered advice to schools on the installation of orchards at schools yards, and provided advice on any aspect of management related to the orchard (soil, biodiversity, plant health etc.). It also offered online courses for teachers on organic agriculture, soil conservation and orchards as didactic tool. Some events was organized as workshops on ecological gardens, on-site workshops and visits to demonstrations orchards to demonstrate soil care and sustainability in a practical manner, as well as to show organic food and how it can contribute to healthy eating.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Andalucia, Spain
School: Agencia de Gestión Agraria y Pesquera de Andalucía
Teacher: Irene de Hond
Age of pupils: 3-16

Castillo de Luna Vocational Training School – Spain

Figure 18. Images from the project Castillo de Luna Vocational Training School.

In the Intermediate Level of Agro-Ecological Production, the school emphasised the importance of soil management. Throughout the year and its seasons, students were practically involved in activities related to agriculture from an agro-ecological approach. The activities included preparation of the soil through e.g. weeding, watering, fertilization, sowing, but also taking care of the plants, harvesting, preparing fertilization, pruning etc. They were carried out both in the school and in private companies/farms. Every academic year, an organic garden was set up in the greenhouse, using environmentally friendly measures.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Alburquerque, Spain
School: Castillo de Luna Vocational Training School
Teacher: José Nieto Palomo
Age of pupils: secondary school

Young Farmers Grow: a field trial project of regenerative agriculture – Italy

Figure 19. Images from the project Young Farmers Grow: a field trial project of regenerative agriculture in Italy.

An orientation toward sustainability and regenerative agriculture was the driver behind Young Farmers Grow. The project was introduced to support activities related to factual study of science, particularly relating to agricultural and environmental sciences in the curricula. Further, it created a link between students and the land to emphasize the importance of proper land management and agronomic techniques. The students were in the age of eleven to fifteen and the main activities include:

- The study and application of good practices for the land
- The management and optimization of water resources
- The measurement and laboratory analysis of soil samples
- The development of a knowledge and awareness of the history of the land.

The aim was also to encourage the use of complementing techniques and practices such as precision farming by using a drone for biological control, shallow tillage and elimination of chemicals, the maintenance of locally grown species such as corn, wheat, pea, soybean, and tomato. Further, there was a historical aspect – meeting with old farmers who explain agriculture in the first half of the 1900s and how it has changed by the use of innovative machinery and new technologies.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Ostiano (CR), Italy
School: Scuola secondaria "Don Gaetano Portioli"
Teacher: Simona Pilotti
Age of pupils: 11-15 years

Our friendly soil: Do you know that everything you eat comes from the soil? – Italy

Figure 20. Our friendly soil: Do you know that everything you eat comes from the soil?

This project aimed to create awareness of soil's importance for the survival of living things through theoretical and practical activities carried out in both in the classroom and in the field. It included four meetings for eight year old students. In the first meeting, the students met with a soil scientist who introduced the topic. They connected the topic to daily actions and habits of the students to make it graspable. The second meeting was in the field, and the concepts brought up in the first meeting was explored. They touched the soil to get a better understanding of soil composition, how it changed with seasons, and how plants grow. They discussed the role of the farmer and how consumer's food choice impact, and they also plant quinoa seeds. In the third meeting, a food technologist supported the exploration of the relationship between food, soil and biodiversity.

They used mini-seedbeds to understand fragility and importance of care for plant. The last meeting was again held in field. They saw flowering fields, pollinating insects and microorganisms. The main activity was to watch the quinoa seeds they planted in the second meeting to illustrate how it developed from soil to table. Again, the role of consumers was brought up and discussed.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Castelplanio (AN), Italy
School: Arca srl benefit
Teacher: Francesca Carbonari
Age of pupils: primary school

Soil is life – Italy

Figure 21. Images from the project Soil is life from Italy.

In this project, fifteen to eighteen year-olds were engaged in experimental scientific activities, such as setting up macro and microscopic examination of culture of microorganisms (bacteria/fungi). Further, they studied seed germination in relation to different growth substrates. An activity for older students was in the process of being implemented. In that they will design a light-tracking agro-photovoltaic panel which can move according to a weather control unit, so in case of bad weather, the panel could flip over and expose it shock-protection side. The objective of the project was to increase soil literacy, how to protect it and create awareness about it. The project targeted an international level but emphasised the national level. The focus was on the complexity of relationships and interdependence in ecosystems throughout the project.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Foligno (PG), Italy
School: Liceo Scientifico e Artistico "G. Marconi" di Foligno
Teacher: Alessandra Mancini
Age of pupils: 15-18 years

I CARE SOIL – Italy

Figure 22. Images from the project I care soil from Italy.

This project focused on the lack of awareness about the importance which contributes to soil degradation. It generated a constructive dialogue and provided practical exercises from which the students in the age of eight to sixteen years old could see the importance of soil. The activity aimed to teach students to recognize animals living in soil – from bees to microorganisms. The students also participated in taking soil samples and analysing the samples. A professor demonstrated through an experiment how a solution with soil and reagents changed colour with variations from purple to red to green due to the interaction between some components of the soil and reagents.

For further information, please visit Best Teaching Practices | Prepsoil

Based in: Sassari, Italy
School: Gruppo Scout sassari
Teacher: Matteo Garau
Age of pupils: 8-16 years

Outreach and dissemination

All finalists were published on the PREPSOIL website and highlighted in PREPSOIL newsletter.

On the 29th of November 2023 the Italian winner was presented at a teacher event (Appendix 4). It was possible for teachers to participate both on site and digitally. All presentations were in Italian. The event was organised by the Re Soil Foundation. The Swedish winner from 2023 will be presented at a national webinar about soil health organised by the Swedish centre for school biology on the 13th of May 2024.

The call and the result from 2023 was presented in a breakout session at the Soil Week in Madrid in November 2023. Christina Lundström from SLU and Sara Guerrini from the company Novamont (one of the Re Soil Foundation founding member) discussed the Italian strategy for soil pedagogy and the Italian winner. Sara did this on behalf of the Italian winner, who was not able to travel to Madrid. In addition, images from the applicants were presented to the audience.

Discussion and conclusion

The aim for PREPSOIL task 6.2 was to identify, promote and reward innovative examples of soil health education for young people in order to inspire teachers around Europe to work with soils and increase soil literacy in society. We can conclude that a lot of interesting and inspiring pedagogy work concerning soil issues are happening in Europe! It is gratifying and hopeful for the future. There is a broad range in learning activities which could provide a diversity in learning experiences, using multiple senses and connecting theory to practice. However, we hope that further work supported by experiences from PREPSOIL and this Task will facilitate soil literacy work and inspire many more teachers around Europe to work with soil issues as part of not only science, technology and mathematics (STEM) but also social, cultural, art and economic topics of learning with their pupils. In order to increase soil literacy in society, reaching the teachers and their pupils would be one important strategy. As many children lives in urban settings with less connectivity to soils, environment and e.g. food production this kind of school activities are important. Practical work combined with analysis and reflections concerning important soil issues would be a good way to increase soil literacy to a wider audience in society. The examples in this report provide many ideas concerning how such work as well as more theoretical and even art inspired soil work could be performed with young people.

For two years PREPSOIL has worked to raise awareness and interest about a soil pedagogy competition among teachers. However, this has been challenging. It is obvious that there are differences among actors from academia or policy concerning how used they are to communicate with primary, secondary and vocational training teachers and accordingly how well developed their communication channels and networks are, hence reaching networks of teachers and schools proved somewhat challenging. First the teachers in the different countries needed to get information to be aware of the call and consider it as worthwhile and interesting to share their soil teaching experience. The second challenge was to also communicate the results to be able to reach the target group. Here the PREPSOIL website was of very limited help. We chose to cooperate with national pedagogy actors with already working communication channels and networks to link to teachers, often in STEM subjects (including biology). However, in some countries such actors already participated in the task and had established collaborative linkages with primary, secondary and / or vocational training schools on a regional or national level. Experiences from the Swedish context tell that even though the communication channel must have been relevant, only one teacher applied. We can only speculate concerning the reasons. In order to increase interest among teachers and thus get more people to apply and then communicate back to teachers in a successful way, we would suggest some improvements. It is key to know the target group, how they work, what their challenges and needs are and how to communicate with them and their networks. Soil is only one of many areas of teaching, and hence teachers have to prioritise according to curriculum. If the curriculum not obviously designate soil issues as important, teachers might even need support and inspiration to interpret it from a soil perspective. Why should I work with soil? Why are soil issues important for my pupils? How do soil activities connect to the curriculum?

If there are any actor in the region or country with a special interest in soil issues in relation to young people, as Re Soil Foundation in Italy, it is important to cooperate with them. Re Soil extensively works with teachers and schools to promote soil literacy and develop training resources about soil that can be downloaded for free from the website. Thanks to this consolidated network and reputation, Re Soil can communicate via a large database which comprises 1,600 teachers and educators. According to the Re Soil Foundation experience in Italy, the first call received a good response from the teachers and Italy had most applications among the participating countries. In

Sweden, the Swedish Centre for School Biology advertised the call in their newsletter, which reach all biology teachers in Sweden. However, soil related issues are only one of many biology topics that this actor communicate. In addition, soil related topics are probably not the most frequently discussed among those teachers.

Accordingly, a good strategy would be to work even closer to each national school context and discuss a suitable arrangement of the activity from the beginning with those. The key questions are how to reach the teachers both in order to get applicants, but also to reach out with the results to their colleague teachers. In that case taking part in exhibitions for teachers or arranging webinars could be interesting. A webinar to introduce the initiative and clarify doubts could be of help in order to improve teachers' engagement as well as the promotion of the initiatives at events that are dedicated to teachers. In that way the number of touchpoints for teachers and the number of participants is likely to increase as well. Regardless of the type of activity, they should be, in native language and arranged by an organisation that is relevant, well known and reputable from a teacher perspective. Teachers could probably be interested in information about soil, but they also appreciate opportunities to exchange experiences and ideas with others. In PREPSOIL it was possible for teachers in Italy, the Netherlands, Norway, Poland, Spain and Sweden to apply in native language, all others must apply in English. The use of native languages makes iteasier for teachers to apply.
Timing is crucial and teachers need time to plan the participation to initiatives. Therefore, we recommend launching initiatives for teachers and students at the beginning of the school year and leave them open for several months. The timing of the calls were likely suboptimal, and should have been better timed. Plenty of time during spring or autumn in order to facilitate outdoor activities could have been convenient.

Some form of prize / reward for the teachers and /or for the students would make a huge difference to improve participation as well as the initiative impact. The prize could involve experiences about soil for teachers / students, such as funding to support a trip to participate in an event dedicated to soil; a kit to develop a school garden; books about soil for youths. This type of prizes would also extend the initiatives' impact in the long term. In 2023 the Swedish winner got tickets to a big agricultural exhibition as a price. At the exhibition a huge pit is dug in an arable field so that the entire profile with different crops could be seen down to a depth of approx. 2 m. That was an appreciated experience for the teachers.

To conclude, knowledge about, cooperation with and communication to each national school context in native language are central key aspects. Teachers like to exchange ideas and experiences from teaching practices if the task is relevant. However, many schools and teachers already work on inspiring projects with their pupils which this report has shown. And hopefully, this PREPSOIL task can support and inspire many more initiatives that would increase soil literacy among young people in Europe. That is good for the future.

Acknowledgement

We thank the participating teachers, schools and pupils for sharing their experiences to help PREPSOIL cross country learning. We also thank the Committee from both 2023 and 2024 whose participants so kindly read applications and struggled to choose winners and runners up, among all fantastic contributions.

Resources

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This version is based on the original report available on Zenodo:
Lundström, E. C., Wärm, E., Mayte, G., Smreczak, B., & Caggiano, M. (2025). Good examples of soil education for youth to increase soil literacy (Version 2). Zenodo.
https://doi.org/10.5281/zenodo.14620581

Appendix 1. Instructions for competitors

Share your "Soil Education Good Example"

Do you have good teaching practices to share from your experience with primary and secondary school pupils on soil health? How do you really capture their attention on how important it is to take good care of our soils? Do you use innovative techniques that you would like to share with your peers throughout the rest of Europe to help children become better "soil caretakers"?
For the 2nd time, PREPSOIL offers the unique opportunity to spread good practices, give visibility to your work and inspire younger generations on how to take good care of our land.

Who can apply?
Primary and Secondary School Teaching Professionals, as well as other organisations, municipalities and any other actors providing outreach activities in the subject that specifically target these groups of young students. Applications from all European countries are welcome. In case you had applied for the PREPSOIL 1st Call, you can send your application again.

Why should I submit?
- Promote your soil pedagogy practices around Europe
- Be awarded as an actor in the frontline of "soil education"
- Inspire others to become active agents on soil sustainability
- Showcase your teaching practice at a regional/national/international level (to be agreed upon with the selected winners)
- Get a PREPSOIL Diploma & obtain recognition as a good example of soil education and how you are supporting the transition towards healthy soil in the future

Requirements for your "Soil Education Good Example"
- Age: this can range from 6 to 20 years old, from kindergarden/primary school to secondary school/vocational training
- Style: the activity can be a work in practice on issues concerning soils, a theoretical work, an art activity around soils, or a combination of the former
- Materials: the activity cannot consist solely of a book, a movie, a website or a game. However, these can be part of the materials prepared by the soil educator
- Pictures: the submission of pictures are welcome, but not mandatory. Please note that should your pictures include people that can be identified, we cannot publish them without their permission

Submit your teaching practice now!
1. Select the language to access the form (English or one of the other 6 native languages)
2. Fill the webform till 15th January 2024 23:59 CET.

Appendix 2. Criteria for evaluation of good soil pedagogy examples in 2023

The more number of yes - the better pedagogy quality.

Criteria	Yes	Partly	No
Is it easy to understand what they have done?			
Is it easy to understand what the purpose was?			
Does the example have elements of factual knowledge?			
Does the example have elements of practical exercises?			
Does the example have elements of reflection?			
Does the example have aesthetic purposes?*			
Does the example involve the pupils/students (or are they passive spectators)?			
Does the example present soil as a complex system – (adapted to the age of the pupils/students)?			
Would you say that this example is good soil pedagogy?			
Summary			

*If the example has an aesthetic theme and purpose, the evaluation will differ from others. Factual knowledge and complexity for instance, would not be important. Adapt the evaluation in this situation.

Appendix 3. Instructions for the committee to evaluate and make decisions concerning winners and runners up in 2024

The applicants got this information concerning the requirements for the application

- The aim is to inspire other teachers!
- Target age of students: this can range from 6 to 20 years old, from primary to secondary education as well as vocational training
- Style: the activity can be a work in practice on issues concerning soils, a theoretical work such as a creative lectures series on soils, an art activity around soils, or a combination of the former;
- Educational Materials: the activity cannot consist solely of a book, a movie, a website or a game. However, these can be part of the materials prepared by the soil educator;
- Pictures: the submission of pictures are welcome, but not mandatory. Are there any recommendations or guidelines to follow with regards to include pictures? Mainly activities, surroundings, people etc.?

How to select the winners
We would like you to rank the stories from 1 to 11 and to select 4 winners. 2 among examples for younger children (<11 years) and 2 among examples for older children (>10 years). Since many of the applicants has a broad range of ages as targets groups, you should end up with 2 examples that are suitable for younger children and 2 examples that are suitable for older children, even though some could be suitable for both groups. The boundary between primary and secondary school is a bit unclear, but seems to be around 11 years.

- Primary school: 4-10 years
- Secondary school or vocational training: > 10 years

When you rank the examples, you can use the following questions:

- Is it easy to understand what they have done, to be able to do the same?
- Is it easy to understand what the purpose is?
- Does it have elements of factual knowledge, practical exercises, reflection and/or aesthetic elements?
- Does it involve the pupils/students (or are they passive spectators)?
- Would this inspire other teachers?
- Would you say that this example is good soil pedagogy?

Appendix 4. Invitation to the Italian webinar 231123

Share your "Soil Education Good Example"

Didactic elements for teaching soil: the factory of life
Food, climate change, biodiversity, circular bioeconomy

Wednesday 29.11.23, 3pm-6:30pm
Cittadellarte – Fondazione Pistoletto – Biella (Italy) and online
The factory of life
Food, climate change, biodiversity, circular bioeconomy

The workshop can be accessed in presence as well as in streaming and the link will be sent to pre-registered teachers prior to the even.

Participation is free and the registration form is available here https://resoilfoundation.org/attivita/elementi-di-didattica-per-insegnare-il-suolo-biella-29-novembre-2023/

Programme:

3:00pm: welcome and presentation of the LET Eat Bi project –Armona Pistoletto - Cittadellarte - Let Eat BI

3:10pm: introduction of Re Soil Foundation, Horizon Mission Soil PREPSOIL project, the 2nd Call for Best Primary & Secondary Teaching Practices for Healthy Soils promoted by Prepsoil, prof.ssa Debora Fino - Politecnico di Torino - RE SOIL FOUNDATION Manuele Degiacomi - ECOFFICINA

Presentation of the "Carbon Cycle, Soil and Biodiversity within Italian students" project (winner of the 1st Best Teaching Practices call promoted by Prepsoil). Stefania Minelli – Liceo Scientifico e Artistico G. Marconi

3:40pm: presentation of SOILAB experiments and practical experiences

4:25pm: climate change: effects on soil and plant health and strategies to limit their impacts - prof. Massimo Pugliese – Università degli Studi di Torino

5:10pm: from waste to resource: the bioplastics example- how circular bioeconomy can improve organic waste recycling - the TEACHING SUSTAINABILITY educational kit - Annalisa Perelli - NOVAMONT Manuele Degiacomi - ECOFFICINA

5:30pm: Q&A and conclusions

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