

# Questions to the Soil

*Living Experience Guides — A Series in Five Volumes*

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# Questions to the Soil

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## Living Experience Guides

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*A Series in Five Volumes*

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*Soil Explorer · Soil Encounter · Soil Memory · Soil Depth · Soil Bridge*

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**Erdpuls Müllrose** Center for Sustainability Literacy, Citizen Science and Reciprocal Economics

Müllrose · Brandenburg · Germany

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Trilingual Edition · DE / EN / PL

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Open Educational Resource (OER)

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*This series and its translations were developed with assistance from Claude (Anthropic PBC). All strategic decisions, philosophical positions, and project commitments are those of the author.*

# Preface

*To the Series Questions to the Soil*

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## Preface

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*Body first, then instrument. Observation first, then measurement. Wonder first, then data.*

— *Erdpuls Design Principle*

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### Why this series?

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We know more about soils than ever before. Satellites measure their moisture. Laboratories analyse their microbiomes. Models project their carbon content across centuries of climate scenarios. And yet: most people who live on this ground have never truly touched it. Never smelled it. Never asked an earthworm for its name.

This gap — between knowing and experiencing, between information and encounter, between what we understand about sustainability and what we actually do — is what educational researchers call the values-action gap. Rational arguments alone do not close it. Data alone does not close it. What closes it is a genuine, embodied experience: the moment when someone kneels, picks up a handful of earth, brings it to their nose, and perceives something they have never perceived before.

This series grew from that moment.

### The approach

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The "Questions to the Soil" are a protocol for structured sensory observation — thirteen questions that lead progressively into the layers of a local soil: from surface to habitat, from texture to history, from immediate perception to long-term care.

The protocol follows three interlocking methodological traditions:

**Goethean natural science.** Johann Wolfgang von Goethe was not only a poet but a serious natural scientist. His approach was radical in its simplicity: describe the phenomenon fully before you explain it. Observe first, then interpret. The thirteen questions are Goethean in their structure — they slow perception down until what is actually present becomes visible.

**Proxemics.** Edward T. Hall showed that people and cultures maintain different distance zones — intimate, personal, social, public — and that each zone activates a different set of sensory channels. Soil is encountered at the most intimate distance: hands, nose, ear, tongue. This series uses Hall's framework deliberately as a pedagogical tool: the way we approach soil spatially is not incidental to learning — it is the learning.

**Citizen science.** Every observation made through these guides is a potential data point. Life counts, infiltration times, pH readings, oral testimonies — all flow into the Erdpuls soil observation archive. The sensor dialogue in each guide ensures that human perception and instrumental measurement are treated as equally valid and mutually complementary forms of knowledge, not arranged in a hierarchy.

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## For whom this series was written

The five guides are written for five very different target groups — and deliberately so. A ten-year-old identifying their first springtail needs something different from an artist returning to the same square metre of ground every day for three weeks, or an elder who knew this landscape in childhood and now compares it against decades of memory. The soil is the same; the mode of encounter differs.

All five guides are nonetheless oriented toward the same goal: that participants leave knowing something they did not know before — not about soils in general, but about *this* soil, *here*, *today*. And that this knowledge shapes their action.

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## How to work with this series

The guides can be used independently or in sequence. The Introduction (Document 00) and Appendix A — the complete 13 Questions protocol — are the shared foundation of all five. Facilitators running multiple guides will find that the terminology, the field materials, and the sensor dialogue remain consistent, while the pace, depth, and pedagogical framing differ significantly by target group.

All guides are published as Open Educational Resources (OER) under Creative Commons CC BY-SA 4.0. They may be copied, translated, adapted, and developed further — on the condition that adaptations are shared under the same terms. We explicitly encourage the transfer of these protocols to other locations, other languages, and other educational contexts. What was developed here for Müllrose belongs to the earth — and therefore to everyone.

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## Acknowledgements

This series grew from and with the Erdpuls campus in Müllrose, Brandenburg — a place of considerable architectural and cultural heritage being transformed into a centre for sustainability literacy, citizen science, and reciprocal economics. Everyone who has got their hands dirty — literally and figuratively — has contributed to it.

Special thanks go to the soils of the Oder-Spree region: the glacial sand, the sandy loam, the boggy subsoil, the earthworms, springtails, and mycelial networks that made these pages possible in the first place.

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*Erdpuls Müllrose, February 2026*

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# Contents and Series Overview

*Questions to the Soil — Living Experience Guides*

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## Contents and Series Overview

This series comprises an introduction, five target-group guides, and shared appendices. All documents are published trilingually (DE/EN/PL) as Open Educational Resources. The guides may be used independently or as a complete sequence.

### Front Matter

Document	Contents
<b>FM-01 Cover Page</b>	Title page of the complete edition
<b>FM-02 Preface</b>	On the origin and philosophy of the series
<b>FM-03 Contents and Series Overview</b>	This page

### The Series

#### Introduction — Document 00

**Title:** Questions to the Soil — Introduction to the Series

**Scope:** Facilitator introduction, conceptual framework, methodological foundations, campus overview, Appendix A (the complete 13 Questions protocol), Appendix B (Soil Explorer Field Sheet for all target groups)

The Introduction is the shared starting point for all five guides. It describes the six integrated pedagogical models of the series — the Three-Stream Approach (Head/Hands/Heart), the 4A-Pathway, Christopher Alexander's Pattern Language, Goethean observation, Hall's Proxemics Theory, and the Token Economy — as well as the spatial campus architecture (Zones A–E) in which the workshops take place. Appendix A contains the complete 13 Questions protocol with all enrichments; Appendix B the Soil Explorer Field Sheet in its standard form.

*Recommended as first reading for anyone facilitating one of the guides.*

#### Guide 1 — Soil Explorer / Boden-Erkunder

**Title:** Questions to the Soil — Guide 1: Boden-Erkunder

**Subtitle:** For Children and Young People (Ages 8–18, School Classes and Informal Groups)

**Duration:** 90–120 minutes · **Group size:** 10–30 · **Season:** Year-round

Guide 1 is the entry point for young people. It introduces the 13 Questions in an age-appropriate, playfully scientific form — with Life Count, ribbon test, Mystery Soil, and the Soil Explorer Field Sheet as the central recording format. Its particular strength is the surprise that comes when a square metre of earth is opened: the discovery that "dead soil" is an ecosystem. The guide differentiates between primary and secondary school adaptations and includes guidance for participants with special educational needs.

*Methodological emphasis: Goethean first encounter, 4A-Pathway (Awareness → Acknowledgment), citizen science as life count.*

## Guide 2 — Soil Encounter / Boden-Begegnung

**Title:** Questions to the Soil — Guide 2: Boden-Begegnung

**Subtitle:** For Adults and Families (Open Community Format)

**Duration:** 2.5–3 hours · **Group size:** 6–20 · **Season:** Year-round, especially spring and autumn

Guide 2 addresses adults — garden enthusiasts, Repair Café participants, Makerspace visitors, families. It begins with practical relevance ("What is this soil telling me about my garden?") and moves from there toward the philosophical. Its core theme is the proxemic barrier that adult participants bring to intimate soil contact — and its dissolution, which typically occurs the moment someone deliberately smells earth for the first time. The Soil Explorer Notebook (a four-page folded booklet) replaces the children's field sheet. The sensor dialogue goes deeper: resolution vs. integration, trends vs. snapshots, what sensors cannot measure.

*Methodological emphasis: transformative learning (Mezirow), citizen science as a home soil observation network, connection to the Repair Café ethic.*

## Guide 3 — Soil Memory / Boden-Gedächtnis

**Title:** Questions to the Soil — Guide 3: Boden-Gedächtnis

**Subtitle:** For Elders and Intergenerational Groups

**Duration:** 2.5–3 hours · **Group size:** 8–16 · **Season:** Autumn (ideal), Spring

Guide 3 inverts the conventional educational relationship: elder participants are the knowledge-holders, not the recipients. Their memory across decades is scientific data — longitudinal, place-specific, irreplaceable. The 13 Questions protocol is augmented with Elder Memory Prompts that ask for historical comparison: Was the soil different before? What grew here before reunification? The Kaffee

und Kuchen format is not incidental — it is a proxemically designed space for informal storytelling. Oral soil histories are transcribed and entered into the Erdpuls archive. The shared mapping exercise produces a collective soil cartography of Müllrose that exists nowhere else.

*Methodological emphasis: oral history methodology (Thomson, Portelli), historical ecology (Foster & Aber), intergenerational learning (Kaplan), proxemic inversion of the age hierarchy.*

## Guide 4 — Soil Depth / Boden-Tiefe

**Title:** Questions to the Soil — Guide 4: Boden-Tiefe

**Subtitle:** For Artists and Researchers (Residency-Depth Immersion)

**Duration:** Multi-day — initial session 3–4 hours + self-directed daily practice over 1–4 weeks · **Group size:** 1–6

Guide 4 is not a workshop format but a protocol for sustained practice. Residents — bio-material artists, citizen science researchers, conservation practitioners, writers — conduct the Three Morning Questions daily and return to the full protocol weekly. The daily practice deepens across weeks: Day 1 is novelty, Day 7 is recognition, Day 21 is intimate familiarity. The protocol does not prescribe what emerges from the soil encounter — whether pigment, dataset, poem, or hypothesis. It ensures that whatever emerges is grounded in genuine, sustained encounter with the place.

*Methodological emphasis: Goethean dwelling-in-phenomena (Bortoft, Naydler), longitudinal ecological observation (Likens), ecological art practice (Wallen), proxemic immersion as epistemological method.*

## Guide 5 — Soil Bridge / Boden-Brücke

**Title:** Questions to the Soil — Guide 5: Boden-Brücke

**Subtitle:** For Cross-Border Groups (DE/PL Trilingual, Intercultural)

**Duration:** Full day (6–7 hours) or two half-days · **Group size:** 12–24 · **Season:** Late spring or early autumn

Guide 5 is the geographically and culturally most expansive of the series. The Oder-Neisse border between Germany and Poland divides politically what belongs together geologically: the same glacial sand, the same moraine, the same soil colour, the same springtails. The workshop makes this fact experiential — through hands, nose, and measurement on both sides of the border. The trilingual language protocol (DE/PL/EN) uses translation moments as pedagogical events: when *thusta ziemia* (Polish) and "fetter Boden" (German) carry slightly different connotations, the cultural difference in how soil fertility is perceived and valued becomes visible. The shared meal — food from both sides — is not peripheral programming; it is the proxemic centre of the day.

*Methodological emphasis: comparative environmental education (Bray), place-based education (Gruenewald), intercultural proxemics (Hall), bioregionalism as pedagogical standpoint.*

## Appendices (in all editions)

Appendix	Contents
<b>Appendix A</b>	The complete 13 Questions protocol with all enrichments (trilingual DE/EN/PL)
<b>Appendix B</b>	Soil Explorer Field Sheet (standard version, print-ready)
<b>Appendix C</b>	BNE Quality Catalogue Brandenburg — reference table for all five guides
<b>Appendix D</b>	Recommended reading and references

## Quick Reference: The Five Guides Compared

	G1 Soil Explorer	G2 Soil Encounter	G3 Soil Memory	G4 Soil Depth	G5 Soil Bridge
<b>Target group</b>	Children & young people	Adults & families	Elders & generations	Artists & researchers	Cross-border groups DE/PL
<b>Format</b>	Single session	Single session	Single session with break	Multi-day residency	Full day / two-part
<b>Duration</b>	90–120 min	2.5–3 hrs	2.5–3 hrs	3–4 hrs + ongoing practice	6–7 hrs
<b>Group size</b>	10–30	6–20	8–16	1–6	12–24
<b>4A emphasis</b>	Awareness	Attitude + Action	Acknowledgment + Attitude	Acknowledgment + Action	Awareness + Acknowledgment
<b>Languages</b>	DE / EN	DE / EN	DE / EN	DE / EN	DE / PL / EN
<b>Citizen science output</b>	Life count	Soil notebook	Oral history record	Longitudinal dataset	Trilingual comparison record

	G1 Soil Explorer	G2 Soil Encounter	G3 Soil Memory	G4 Soil Depth	G5 Soil Bridge
<b>Distinctive feature</b>	Mystery Soil, Field Sheet	Repair Café connection	Kaffee und Kuchen, map	Three Morning Questions	Shared meal, border geology

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# Questions to the Soil — Living Experience Guides: Introduction

*How to Use the Five Target-Group Guides — Appendix A*

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# Questions to the Soil — Living Experience Guides

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## Introduction and Overview

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**Erdpuls Müllrose — Living Laboratory & Makerspace Garden**

**Version:** 1.2 **Date:** February 2026

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## Changelog

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Version	Date	Changes
1.2	February 2026	BNE compliance update: measurable learning objectives added to all five guide Overview tables (Area 1.2); sustainability dimensions mapped per guide (Area 2.1.1); SDG links with justification added per guide (Area 2.1.3); methodological foundations with citations added per guide (Area 3.2.2/3.2.3); facilitator qualification requirements added to all Facilitator Notes sections (Areas 6.1.1/6.1.2); pre-workshop preparation reference (3.3.1) and post-workshop follow-up resources (3.3.3) added to all Facilitator Notes; BNE Criteria Coverage Reference table added to introduction
1.1	February 2026	Institution name updated; license footer added; version updated for OER publication
1.0	October 2025	Initial release

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## How to Use These Guides

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This collection contains five complete living experience guides, each adapting the "Questions to the Soil" phenomenological protocol (Appendix A of the Pattern Discovery Toolkit) to a specific target group. Each guide is designed to stand alone — a facilitator can print the relevant guide and use it directly in the field.

The five guides share a common core (the 13 Questions, plus a 14th auditory enrichment at Question 8b), but differ substantially in language register, duration, pedagogical framing, sensory activities, sensor integration, citizen science outputs, and follow-up actions. The differences are not simplifications or complications of a "standard" version — each guide is a complete, coherent experience designed for how its particular participants perceive, learn, and relate to soil.

**The Proxemic Layer:** Each guide includes proxemic facilitation notes — spatial design guidance drawing on Edward T. Hall's theory of proxemics (*The Hidden Dimension*, 1966). These notes address how physical distance, sensory channel activation, spatial arrangement (sociopetal vs. sociofugal), and vertical positioning shape learning quality. The soil protocol is the most proxemically intense activity in the entire Pattern Discovery Toolkit: it systematically moves participants into intimate proxemic distance (0–45 cm) with a non-human entity, activating all five sensory channels (touch, smell, thermal, auditory, visual). Understanding this proxemic architecture helps facilitators recognize why certain moments produce extraordinary engagement and how to sustain that quality across the full workshop. For the complete proxemic framework, see the *Proxemic Integration* companion document.

### The five guides:

**Guide 1:** Children and Youth (Kinder und Jugendliche) — Ages 8–18, school classes **Guide 2:** Adults and Families (Erwachsene und Familien) — Open community format **Guide 3:** Elders and Intergenerational Groups (Ältere Menschen) — Knowledge-holders as co-teachers **Guide 4:** Artists and Researchers (Künstler\*innen und Forscher\*innen) — Residency-depth immersion **Guide 5:** Cross-Border Groups (Grenzregion DE/PL) — Trilingual, intercultural

Each guide follows a consistent structure for easy facilitator reference:

- Overview (who, what, why, how long)
- Preparation and Materials
- Welcome and Framing
- The Experience (adapted 13 Questions)
- Sensor Dialogue
- Citizen Science Output
- Closing and Reflection
- Follow-Up and Continuation
- Token Economy Integration
- Facilitator Notes
- Seasonal Variations
- Risk and Safety Considerations
- Proxemic Design Notes (spatial arrangement, sensory channels, facilitation positioning)



## BNE Criteria Coverage Reference (Areas 1–7, Brandenburg Qualitätskatalog)

This document series addresses the **Angebotsqualität** sections of the Brandenburg BNE Quality Catalog (*Qualitätskatalog für außerschulische Anbieterinnen und Anbieter von Bildung für nachhaltige Entwicklung (BNE) im Land Brandenburg*, MLUK Brandenburg, April 2023). The table below maps each guide to the BNE quality areas it primarily demonstrates, to assist facilitators, evaluators, and certification reviewers. For the full program-level criterion-by-criterion alignment, see the *BNE-Bewertung und Leitbild* document and the *Pattern Discovery Toolkit* Appendix D.

Guide	Target Group	Primary BNE Areas	Key Criteria
1	Children & Youth	1, 2, 3, 4	1.1.1 (Lebenswelt: soil as daily-life ground beneath school-age feet); 1.2 (4 measurable learning objectives); 2.1.1 (all four sustainability dimensions); 2.1.3 (SDG 4, 13, 15); 3.1 (experiential, activating, reflective); 4.1.3 (interdisciplinary); 4.3.3 (empathy for soil organisms)
2	Adults & Families	1, 2, 3, 4, 5	1.2 (4 measurable behavioral outcomes); 2.1.1 (four dimensions); 3.1.5 (reflektiert via values-action gap); 4.3.1 (self-reflection via Soil Explorer Notebook); 5.2.1 (notebook as praxis reflection data)
3	Elders & Intergenerational	1, 2, 3, 4, 5	2.2 (Perspektivenvielfalt: historical-ecological comparison across eras); 3.1.5 (reflektiert via Elder Memory Prompts); 4.1.2 (foresight: past → present → future trajectory); 5.2 (oral soil history as longitudinal evaluation data)
4	Artists & Researchers	1, 2, 3, 4, 5	1.2 (research-depth measurable outcomes); 3.2.2/3.2.3 (Goethean and longitudinal methodological foundations with citations); 4.1 (interdisciplinary competency via cross-method integration); 5.1–5.2 (residency output as quality development contribution)

Guide	Target Group	Primary BNE Areas	Key Criteria
5	Cross-Border (DE/PL)	1, 2, 3, 5	1.1.1 (Lebenswelt: shared glacial landscape); 2.1.1 (four dimensions across national frameworks); 2.2 (Perspektivenvielfalt: two national traditions, three languages); 5.3 (Kooperation: cross-border citizen science network design)

*Minimum requirements of the Brandenburg Qualitätskatalog are addressed collectively across all five guides and the wider Erdpuls program. No individual guide is required to meet all criteria independently — these are workshop guides, not standalone educational programs.*

## Cross-Guide Reference: How the Five Guides Relate

The five guides are designed to work independently, but they also form a system. The richest outcomes emerge when the same soil patches are visited by multiple target groups across a year:

- **Spring:** School class (Guide 1) visits and establishes baseline observations with fresh eyes and high energy.
- **Early Summer:** Adults and families (Guide 2) deepen with practical garden knowledge and begin home-garden comparison.
- **Midsummer:** Artist/researcher in residence (Guide 4) begins multi-week daily practice, producing the deepest sustained observation.
- **Autumn:** Intergenerational group (Guide 3) layers elder memory over the accumulated data from spring and summer.
- **Late Autumn:** Cross-border group (Guide 5) extends the observation across the political boundary, contextualizing the campus soil within the larger bioregion.
- **Winter:** All data synthesized. Pattern cards written. The pattern language of this soil begins to take shape.

This annual cycle mirrors the Erdpuls seasonal rhythm (Frühling: Pflanzen und Planen. Sommer: Wachsen und Sammeln. Herbst: Verarbeiten und Bewahren. Winter: Reparieren und Reflektieren) and produces a cumulative body of knowledge that no single visit, by any single group, could generate.

**Proxemic accumulation across the year:** When multiple target groups visit the same soil patches across a year, the proxemic depth of the community's relationship with those patches accumulates. The children's energetic intimate encounter (spring) is followed by the adults' reflective personal encounter (summer), deepened by the resident's sustained daily intimacy (midsummer), layered with the elder's

temporal proxemic memory (autumn), and extended across a cultural boundary by the cross-border group (late autumn). By winter synthesis, the soil patches have been encountered at intimate distance by dozens of people across all five target groups, through multiple sensory channels, across multiple seasons. The pattern cards produced in the winter synthesis represent knowledge that was generated through this accumulated proxemic contact — not through research conducted at public distance, but through repeated, multi-sensory, embodied engagement at intimate and personal distance with specific ground.

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# Questions to the Soil — Guide 1: Erdreich-Entdecker

*For Children and Youth (Ages 8–18, School Classes)*

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# Guide 1: Erdreich-Entdecker — The Soil Explorers

## For Children and Youth (Ages 8–18, School Classes)

### Overview

<b>Title</b>	Erdreich-Entdecker / Soil Explorers / Odkrywcy Gleby
<b>Target Group</b>	School classes, youth groups (ages 8–18, with age-differentiated variants)
<b>Group Size</b>	10–30, divided into teams of 3–5
<b>Duration</b>	Half day (3–4 hours including breaks)
<b>Location</b>	Erdpuls campus garden (Zone B) and surrounding areas
<b>Season</b>	All seasons (with seasonal adaptations noted below)
<b>Learning Objectives</b>	By the end of this workshop, participants will: (1) demonstrate bodily observation of soil using at least four senses and articulate at least three distinguishing properties of their assigned patch compared to another team's patch; (2) compare at least two sensor measurements with bodily perception and identify one agreement and one discrepancy between instrument data and embodied observation; (3) count and record at least five living organisms in their soil patch and enter the data as a citizen science contribution to the Erdpuls soil record; (4) name one concrete action they will take to protect or improve soil health in their daily life — at home, at school, or in their neighbourhood
<b>Sustainability Dimensions</b>	<b>Ecological</b> (direct biodiversity observation; soil as living system; organism-habitat relationships; seasonal soil dynamics); <b>Economic</b> (soil as the foundation of all food production; the economic value of healthy topsoil and biodiversity); <b>Social</b> (team-based inquiry; citizen science as community contribution; school-campus-community partnership); <b>Cultural</b> (Goethean observation as European scientific heritage; local landscape stewardship; embodied knowing as legitimate form of knowledge)

<b>SDG Links</b>	<b>SDG 4</b> (Quality Education — experiential, inquiry-based, hands-on learning; OER publication of all outputs); <b>SDG 15</b> (Life on Land — biodiversity documentation, soil organism awareness, iNaturalist contribution); <b>SDG 13</b> (Climate Action — soil carbon storage, phenological data contribution to longitudinal monitoring)
<b>4A-Pathway Focus</b>	Awareness and Acknowledgment (younger); full pathway for older youth
<b>Curriculum Links</b>	Biology (soil ecology, organisms), Geography (geology, landscape), Chemistry (pH, minerals), Mathematics (measurement, data), Art (observation drawing), Sachunterricht (primary)
<b>Methodological Foundations</b>	Goethean phenomenology (Goethe, 1820; Naydler, 1996): observation-before-interpretation as foundational scientific discipline. Situated learning (Lave & Wenger, 1991): authentic participation in real-world practice as the most effective learning mode. Citizen science methodology (Bonney et al., 2009): participant-generated data of genuine scientific value contributing to longitudinal datasets.
<b>BNE Competencies</b>	3.1.1 (experiential), 3.1.3 (activating), 3.1.7 (holistic), 4.1.3 (interdisciplinary), 4.3.3 (empathy)

## Preparation and Materials

**Per team (3–5 children):** - 1 sturdy trowel or digging stick - 1 hand lens (10x magnification) — inexpensive plastic ones work well - 1 white plastic tray or plate (for sorting soil life) - 1 spray bottle with water - 1 small jar with lid (for taking a soil sample home) - 1 Soil Explorer Field Sheet (see below — printed, one per child) - Colored pencils (at least 6 colors) - 1 timer or smartphone (facilitator holds for younger groups)

**For the group:** - pH test strips (simple color-change type, not digital) - 1–2 soil temperature probes or digital thermometers - If available: 1 portable soil moisture sensor per team - A bucket of warm water and soap for handwashing at the end - First aid kit - Erdpuls campus soil sensor dashboard displayed on a tablet or printed screenshot

**Advance Preparation by Facilitator:** - Walk the site the day before and select 4–6 soil patches with visibly different characteristics (e.g., under a tree, in open garden, near a building wall, in compost area, in a path, in a meadow). Mark them with small flags or stones. - Prepare a "mystery soil" — a jar of soil from an unusual location on campus (e.g., under the heritage brick building, from the compost pile, from the sandy subsoil). This is used in the closing activity. - Print Soil Explorer Field Sheets. - Charge tablet for sensor dashboard display. - Brief any accompanying teachers on the hands-on nature of the experience: children will get dirty. This is correct and intended.

## The Soil Explorer Field Sheet

*This is a simplified, visual version of the 13 Questions, designed for field use by children. It should be printed as a single A4 sheet, double-sided, with space for drawing and writing.*

### Side 1:

**MY SOIL PATCH** Date: \_ **Season:** *Weather:* **My name:** \_ **Team:** *Patch location:*

**FIRST LOOK** — Before you touch anything, draw what you see. Use colors. [Large blank box for drawing]

**WHAT COVERS THE GROUND?** Circle what you see: Living plants / Dead leaves / Bare earth / Moss / Stones / Crust / Mulch / Water / Other: \_\_\_\_\_

**COLOR** — What color is the surface soil? \_ **Dig 10 cm down. What color is the soil there? Are they the same or different?** \_

**TOUCH** — Pick up some soil from 10 cm down. Circle the words that fit: Gritty / Smooth / Sticky / Crumbly / Hard / Soft / Cool / Warm / Damp / Dry Can you roll it into a worm shape? Yes / No. How long before it breaks? \_\_\_\_\_ cm

**SMELL** — Bring the soil close to your nose. Describe the smell (not just "earthy"!):

### Side 2:

**LIFE COUNT** — Look carefully at the soil surface and in your hole for 2 minutes. Draw and count everything alive:

What I Found	How Many	Drawing
Total living things found: _____		

**WATER TEST** — Pour a small cup of water on the surface near your hole. Count slowly. How many seconds until the water disappears? \_\_\_\_\_ seconds Did it: soak in / pool on top / run to one side? Circle one.

**SOUND** — Put your ear close to the ground. What can you hear? Insects? Water? Wind? What I hear at ground level: \_ **What I hear standing up: What changed?** \_

**ROOTS** — Look at the sides of your hole. Draw the roots you see. How deep do the biggest roots go? \_\_\_\_\_ cm [Box for drawing]

**THE BIG QUESTION** — If this soil could talk, what would it say? Write or draw your answer. [Box for response]

**MY SOIL'S MEASUREMENTS:** Temperature: \_ °C **pH:** *Moisture:* \_\_

### Welcome and Framing (15 minutes)

Gather the group at the garden entrance (Zone B threshold — the pattern "Schwelle" from Ring 1). Do not begin indoors.

**For ages 8–12:** "Today you are scientists. Not the kind who sit in laboratories — the kind who go outside and discover things nobody has noticed before. You are going to meet the ground. You walk on it every day, but have you ever really looked at it? Listened to it? Smelled it? Today you will. And you'll discover that the ground is alive — more alive than you think."

Introduce the teams, distribute materials, assign each team to a pre-marked soil patch. Explain: "Every team has a different patch. At the end, we'll compare — and discover why the same garden has so many different soils."

**For ages 13–18:** "We have sensor networks that measure this soil continuously — temperature, moisture, pH, every few minutes, all year. That data is real and important. But today we're going to ask a harder question: what can you find out about this soil *without* any technology? Just your hands, eyes, nose — your body as a measuring instrument. Then we'll compare what your body tells you with what the sensors say. The disagreements are where the interesting science starts."

Introduce the citizen science framing: "The observations you make today will become part of the Erdpuls soil database. You're not practicing — you're contributing real data."

### The Experience (90–120 minutes)

#### Phase 1 — Solo Encounter (15 min)

Each child kneels or sits at their team's patch. Two minutes of silence — just looking. They complete "First Look" on the Field Sheet (drawing). No talking during this phase. This is often difficult for younger children; the facilitator should model it themselves.

*Proxemic note:* This phase moves children from social/public distance (the group, the garden overview) to intimate distance (face-to-ground, one patch). The facilitator should kneel or squat to the same height as the children — standing over kneeling children introduces vertical proxemic dominance that undermines the participatory intention. Model the behavior: kneel, look closely, be still. Children follow modeled proxemic behavior more readily than verbal instruction.

#### Phase 2 — Guided Questions (45–60 min)



The facilitator moves between teams, reading the questions aloud (one at a time, for the whole group to hear, then time for each team to investigate). The questions are the simplified versions on the Field Sheet:

*Question 1–2 (Surface and Cover):* Teams document what covers their patch. Introduce the vocabulary: "mulch," "crust," "litter layer."

*Question 3 (Color):* Teams dig their hole (10–15 cm). Younger children may need help with the trowel. Immediately attend to color — compare surface and depth.

**Facilitator prompt for curiosity:** "Why do you think the surface color and the deep color are different? What happened to make them different?" Do not answer this yet. Let it sit.

*Question 4 (Touch/Texture):* The ribbon test. Show the technique once: wet a marble-sized ball of soil, roll it between palms into a cylinder, then flatten it between thumb and forefinger into a ribbon. How long before it breaks? Short ribbon (< 2 cm) = sandy. Long ribbon (> 5 cm) = clay. In between = silt or loam. Children enjoy this enormously — it is tactile, skill-based, and produces a tangible result.

*Question 5 (Smell):* Encourage specificity. "It smells earthy" is not enough. "It smells like mushrooms after rain" or "like the inside of a flowerpot" or "like nothing at all" — all are better because they are precise.

*Question 6 (Structure — simplified for children):* "Pick up a clump. Does it break into smaller clumps, or does it just fall apart like sand, or does it stay as one hard lump?" Younger children can categorize into "crumbly," "sandy," or "clumpy."

*Question 7 (Life Count):* The highlight for most children. Give each team a white tray. They gently crumble soil from their hole onto the tray and look for anything alive or moving. Use the hand lens. Count for exactly 2 minutes (use the timer). Record every organism, even if they cannot name it. "Something small and white that jumps" is a valid observation (likely a springtail). "A red spider thing" is a valid observation (likely a mite).

*Proxemic note:* This is the proxemic peak for children — faces within 10–20 cm of the soil surface, deep intimate distance. For some children this is thrilling; for others it triggers discomfort (unknown creatures at intimate distance). Normalize both: "Some of you will want your nose right in the tray. Some will want to stay a bit further back. Both are fine. The hand lens brings things close without requiring your face to be close."

**For ages 8–12:** This often becomes the most remembered part of the experience. Children who were reluctant to touch soil are now fascinated. Give this phase extra time if the group is engaged. Have magnifying glasses available for sharing.

**For ages 13–18:** Introduce the concept of soil food webs. "Everything you found is connected. The mites eat the fungi. The springtails eat the bacteria. The beetle larvae eat the springtails. You're looking at an ecosystem as complex as a coral reef, but under your feet."

*Question 8 (Water Test):* Each team pours exactly one cup (100 ml) of water onto the undisturbed surface next to their hole. They count seconds until the water disappears. This is a quantifiable measurement — it produces a number that can be compared between teams.

*Question 8b (Sound — Proxemic Enrichment):* "Now put your ear close to the ground — as close as you can. What can you hear? Insects moving? Water? Wind in the grass above you? Now stand up. What changed? What sounds disappeared?" This completes the full sensory circuit: touch (Question 4), smell (Question 5), sight (Questions 1–3, 6–7), water observation (Question 8), and now sound. The contrast between ear-to-ground and standing-height sound is itself a proxemic lesson: the world sounds different at different distances.

*Questions 9–10 (Roots and Layers):* For younger children, combine these into "Look at the sides of your hole. Draw what you see — the roots, the colors, the layers." For older youth, distinguish between root architecture (spreading vs. tap root) and soil horizons (the visible layering).

*Question 11 (History — adapted):* "What do you think has happened to this soil? Was it ever a road? A garden bed? A forest? A building site? What clues tell you?"

*Question 12 (Relationships — adapted):* "Look around from where you're kneeling. What is uphill from your patch? What is downhill? Where does the rain go when it hits your patch? What grows on the next patch over, and is it the same or different?"

*Question 13 (The Big Question):* "If this soil could talk, what would it say?" This is deliberately open — children may respond scientifically ("I need more water"), emotionally ("I'm tired of being walked on"), or imaginatively ("I remember when there was a forest here"). All responses are valid and revealing.

### Phase 3 — The Measurement Round (20 min)

Now introduce the instruments. The facilitator demonstrates:

- **Soil thermometer:** Insert 10 cm deep, wait 60 seconds, read. Each team measures their patch.
- **pH strips:** Take a small soil sample, mix with a little distilled water, dip the strip, compare to the color chart.
- **Soil moisture sensor (if available):** Insert probe, read the value.

Teams record these measurements on their Field Sheet. The facilitator also reads out the nearest permanent sensor's current values from the Erdpuls dashboard.

### Sensor Dialogue (15 minutes)

Gather the whole group. Display the Erdpuls sensor dashboard on the tablet.

"Your hands told you something. The instruments told you something. The permanent sensors on this campus tell us something continuously. Let's compare."

Write the teams' measurements on a shared chart (whiteboard, large paper, or verbally):

Team	Patch Location	Temperature (felt)	Temperature (measured)	pH	Moisture	Life Count	Water Infiltration (seconds)
1	Under the apple tree	Cool	9°C	6.5	High	14	8 sec
2	Open garden bed	Warm	14°C	7.0	Medium	7	15 sec
3	Near the brick wall	Very warm	16°C	7.5	Low	3	45 sec
4	Compost area	Warm and damp	18°C	6.0	Very high	22	5 sec

The differences between patches — often dramatic even within a small garden — are the teaching moment. "You all live in the same town, go to the same school, stand in the same garden. But the soil under your knees was completely different from the soil under your neighbor's knees. Why?"

This is where the 4A-Pathway activates: Awareness ("I notice the soil is different here") becomes Acknowledgment ("I am connected to this specific ground, which has its own character and needs").

### Citizen Science Output

**For ages 8–12:** Each team's Life Count, Water Infiltration time, and measurements become entries in the Erdpuls Soil Diary — a simple logbook kept in Zone B. If the visit is repeated in another season, the comparison is displayed on a poster. Children sign their entries.

**For ages 13–18:** Data is entered into the Erdpuls open data system (spreadsheet or API, depending on infrastructure). Species observations from the Life Count can be uploaded to iNaturalist if identifiable to species level. The data set joins the longitudinal record — if another class visits the same patches next month or next year, the comparison enables genuine research questions.

If sensor-building workshops (Zone C) are part of the school program, the soil observation becomes the *reason* for building a sensor: "You discovered that the soil near the wall is hotter and drier. Let's build a sensor to monitor that continuously and see if it changes through the year."

## Closing and Reflection (20 minutes)

**The Mystery Soil:** Show the jar of soil prepared beforehand. Pass it around. "Where on this campus does this soil come from? Use everything you learned today to figure it out." Teams discuss, make guesses based on color, texture, smell, moisture. Reveal the answer. This reinforces the transferability of what they learned — they can now "read" soil.

### Circle Closing:

For ages 8–12: Each child says one word about what they discovered today. For ages 13–18: Each person shares one thing the soil told them that the sensor could not, or one thing the sensor told them that their body could not.

**Handwashing.** (Important — do not skip. This is the transition back to "normal" mode, and it also models hygiene after soil contact.)

## Follow-Up and Continuation

**In School (1–2 lessons):** - Complete a "Soil Portrait" — a drawing or painting combining the observations into a single image of their patch. These can be displayed in the school and photographed for the Erdpuls archive. - If the class has a school garden: repeat the protocol on their own soil. Compare school soil with Erdpuls soil. - Write a "Soil Story" — a short narrative from the soil's perspective (links to creative writing curriculum). - Older students: graph the class data set. What correlations emerge between temperature, moisture, pH, and life count?

**At Erdpuls (seasonal return):** - The class is invited to return in a different season and repeat the protocol at the same patches. The seasonal comparison is one of the most powerful longitudinal learning experiences: "In spring, your patch had 22 organisms. In winter, how many? Where did they go?" - Return visits activate the token pathway (Cooperation tokens for seasonal commitment).

## Token Economy Integration

Activity	Token Element	Notes
Completing the field sheet	Cooperation	Team effort, collective observation
Life Count data entering the Erdpuls database	Mutualism	Data serves future visitors and researchers
Returning for a seasonal repeat	Cooperation + Regeneration	Longitudinal commitment
Creating a Soil Portrait for the Erdpuls archive	Mutualism	Cultural contribution to the commons

Activity	Token Element	Notes
Building a sensor to monitor their patch (Zone C follow-up)	Reciprocity	Learning flows both ways: soil teaches child, child monitors soil

Tokens are explained age-appropriately: "When you share your observations with the Erdpuls community, you're doing something generous — like a plant sharing oxygen. That generosity is recorded, and it means something."

## Facilitator Notes

**BNE Qualification Requirements (Areas 6.1.1/6.1.2 — minimum: one of the following):** Facilitator should hold either (6.1.1) formal qualifications in a relevant field (biology, ecology, environmental education, outdoor education, science education) or (6.1.2) demonstrated personal qualification through equivalent experience: minimum 2 years leading outdoor science workshops with school-age groups, plus completion of the Erdpuls facilitator induction (including personal practice of the full 13 Questions protocol). Basic ecological literacy (ability to identify common soil organisms with reference materials, interpret pH and moisture readings) is a practical prerequisite for all facilitators of this guide.

**Pre-Workshop Participant Preparation (Area 3.3.1):** Send to accompanying teachers or group leaders at least one week before the visit: (a) brief information about the workshop format — students will be outdoors, hands-on, getting dirty; appropriate clothing is required; (b) a one-page "What is citizen science?" primer (available from the Erdpuls facilitator pack); (c) the "Soil Curiosity Sheet" — five simple questions for students to consider before arrival ("When did you last look at soil closely? What do you expect to find if you dig a hole in a garden?"). Pre-visit teacher briefing (by phone or email) is recommended for classes with SEN participants to agree on individual adaptations.

**Post-Workshop Follow-Up Resources (Area 3.3.3):** Provide to teachers and students after the visit: (a) the class's data export from the Erdpuls soil database (PDF or spreadsheet, generated within one week of the visit); (b) the "Soil Portrait" continuation activity guide (one-page PDF); (c) an invitation to return for a seasonal repeat visit with pre-booked dates; (d) iNaturalist project link for any species observations made during the Life Count; (e) digital or printed copy of the student's completed Soil Explorer Field Sheet (facilitator photographs all sheets before students take them home).

## Common Challenges:

*"I don't want to touch it."* — Never force. Offer the hand lens instead: "You can be the team's microscope scientist." Most reluctant children come around when they see peers enjoying the texture and smell activities. If not, observation-from-a-distance is a valid participation mode.

*Over-excitement at the Life Count* — Children may want to collect organisms. Emphasize: "We observe, we count, we gently return them. They live here." Model the gentle handling.

"Is this the right answer?" — This is the most important moment. "There is no right answer. There is what you observe. Your observation is your data."

*Weather concerns* — The protocol works in rain (soil behaves differently when wet — a learning opportunity). It does not work well in hard frost when the ground cannot be dug. Snow cover creates a modified version: "Questions to the Snow" (what is under the snow? How does the soil underneath differ from exposed soil?).

### Age Differentiation:

Element	Ages 8–10	Ages 11–14	Ages 15–18
Questions	8 of 13 (skip Structure, Layers, History in detail)	11 of 13 (simplify History and Relationships)	Full 13
Recording	Mostly drawing, circling, single words	Drawing + short written descriptions	Full written observations + data tables
Sensor integration	Facilitator demonstrates; children read	Children operate instruments with guidance	Independent measurement, data entry
Citizen science output	Logbook entry, Soil Portrait	Logbook + iNaturalist attempt	Full data set, database entry, possible research question
Reflection depth	"What surprised you?"	"What did your body know that the sensor didn't?"	"What hypothesis would you test next?"
Duration	2.5 hours	3 hours	3.5–4 hours

### Seasonal Variations

Season	Key Adaptations
<b>Spring</b> (March–May)	Focus on emergence: what is waking up in the soil? Root growth visible. Soil warming measurable day by day. Ideal for first visit.
<b>Summer</b> (June–August)	Maximum biodiversity in Life Count. Soil temperature contrasts strongest (sun vs. shade). Drying patterns visible. Water infiltration test most dramatic.

Season	Key Adaptations
<b>Autumn</b> (September–November)	Decomposition focus: leaf litter arriving, fungi fruiting, soil organisms processing organic matter. Color changes in soil surface. Ideal for "History" question (layers of decay visible).
<b>Winter</b> (December–February)	Reduced but not absent life. Frost effects on soil structure. Snow cover as insulation (measure temperature under snow vs. exposed soil). The "emptiness" is itself a teaching moment: "Where did everything go?"

## Risk and Safety

- **Handwashing** mandatory after soil contact (bucket with soap at site)
- **No soil ingestion** (remind younger children; this is about smelling, not tasting)
- **Tetanus** — ensure school has current vaccination records; inform accompanying teachers
- **Allergies** — ask in advance about mold or pollen allergies; participants with severe allergies can use gloves and observe from slight distance
- **Sharp objects** in soil — facilitator pre-checks each patch; children use trowels, not bare hands for digging
- **Sun/weather** — hats and water in summer; warm clothing in winter; rain gear if needed
- **Accompanying adults** — minimum 1 adult per 10 children (in addition to facilitator)

## Proxemic Design Notes

**The proxemic arc of this guide:** The workshop moves from public distance (arrival, garden overview) → intimate distance (soil encounter, Phases 1–2) → social distance (sensor dialogue, group comparison) → personal distance (mystery soil, circle closing). This arc provides the proxemic scaffolding that prevents engagement from dropping: the intense intimate phase is bookended by social/personal phases that allow participants to process what they experienced.

**Age-differentiated proxemic comfort:** - Ages 8–10 have fewer proxemic inhibitions — they readily touch, smell, and get close. The challenge is channeling energy, not overcoming resistance. - Ages 13–16 have heightened proxemic self-consciousness, especially around peers. The soil protocol requires intimate behavior (kneeling, smelling, putting face near ground) that can feel "embarrassing." The professional frame ("This is how geologists work") gives older adolescents proxemic permission. Pair work reduces vulnerability — two people sharing an intimate-distance activity feel less exposed than one person performing it before a group.

**The transition from soil to sensors is a proxemic shift:** Children move from intimate distance (hands in soil, face near ground, all channels active) to social/public distance (gathered around a tablet, vision-only). This shift can cause restlessness if not scaffolded. Solution: during the sensor dialogue, pass soil samples between teams. "Team 3, pass your soil to Team 1. Feel the difference." The physical passing maintains intimate-distance connection while the cognitive work operates at social distance.

**Facilitator height:** During all soil-contact phases, the facilitator should be at the same level as the children — kneeling, squatting, or sitting on the ground. Standing instruction during intimate-phase work introduces a vertical power dynamic that closes the learning space. Save standing height for safety scanning and group transitions.

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# Questions to the Soil — Guide 2: Boden-Begegnung

*For Adults and Families (Open Community Format)*

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## Guide 2: Boden-Begegnung — Encountering the Soil

### For Adults and Families (Open Community Format)

#### Overview

<b>Title</b>	Boden-Begegnung / Encountering the Soil / Spotkanie z Glebą
<b>Target Group</b>	Adults (open community), families with children, Open Makerspace Day visitors, Repair Café participants, garden enthusiasts
<b>Group Size</b>	6–20
<b>Duration</b>	2.5–3 hours (weekend morning or afternoon format)
<b>Location</b>	Erdpuls campus garden (Zone B) with comparison sites on campus grounds
<b>Season</b>	All seasons; especially suited to early spring (garden-planning relevance) and autumn (harvest/decomposition)
<b>Learning Objectives</b>	By the end of this workshop, participants will: (1) apply the 13 Questions protocol independently to assess soil condition at their assigned patch and articulate at least five findings in their own words; (2) identify at least two specific ways their soil observation could change their home garden or allotment management, written in the Action section of their Soil Explorer Notebook; (3) compare instrument readings with bodily observation at the same location and explain in their own words why both data sources are necessary and non-replaceable; (4) contribute at least one validated measurement entry (temperature, pH, moisture, life count) to the Erdpuls soil observation record

<b>Sustainability Dimensions</b>	<b>Ecological</b> (soil food web; organic matter cycles; biodiversity as soil health indicator; water infiltration and climate resilience); <b>Economic</b> (soil health as economic asset for food growers; composting as circular economy practice; cost-benefit of soil care vs. purchased inputs); <b>Social</b> (community-building through shared practice; intergenerational connection when families participate; Repair Café as civic infrastructure for sustainability); <b>Cultural</b> (Goethean observation as European intellectual tradition; local food culture; repair ethic extended below the surface)
<b>SDG Links</b>	<b>SDG 2</b> (Zero Hunger — home and allotment food growing; soil health as food security foundation in the local region); <b>SDG 15</b> (Life on Land — biodiversity documentation; soil organism awareness; home garden and allotment as habitat corridor); <b>SDG 11</b> (Sustainable Cities and Communities — community soil knowledge network; distributed citizen science across Müllrose and the Oder-Spree region)
<b>4A-Pathway Focus</b>	Full pathway, with emphasis on Attitude ("How do I relate to this ground?") and Action ("What will I do differently in my own garden?")
<b>Practical Connection</b>	Directly applicable to home gardening, allotment management, food growing, composting
<b>Methodological Foundations</b>	Goethean phenomenology (Naydler, 1996): receptive, patient observation as the primary pathway to ecological knowledge. Transformative learning theory (Mezirow, 1991): embodied encounter with the unexpected (e.g., discovering that "dead" soil contains dozens of organisms) triggers perspective transformation. Citizen science methodology (Bonney et al., 2009): distributed adult observation contributing to longitudinal monitoring.

## Preparation and Materials

**Per pair or individual:** - Trowel - Hand lens - Soil Explorer Notebook (see below — a half-A4 folded booklet with the 13 Questions and recording space, more text-based than the children's field sheet) - Pencil - Water bottle (personal) and small cup for infiltration test - Small labeled jar for take-home soil sample

**For the group:** - pH strips, soil thermometer, moisture sensor - Erdpuls sensor dashboard on tablet - Reference card: "Reading Your Soil" (laminated A4 with texture triangle, color guide, and pH interpretation — for use during and after the workshop) - Thermos of tea/coffee and seasonal snack from the garden (if available) for the closing circle - Handwashing station

**Advance Preparation:** - Select 3–4 comparison patches representing different conditions: a well-managed garden bed, a neglected/compacted area, a wild/unmowed area, and a transitional zone (e.g., the edge where garden meets path). These represent common conditions adults encounter in their own spaces. - If families with young children attend, prepare simplified materials (drawing sheets, magnifying glasses) alongside the adult materials.

### The Soil Explorer Notebook

*A four-page folded A4 booklet. More sophisticated than the children's field sheet but still field-practical — writing in soil-stained conditions.*

**Page 1 (Cover):** Boden-Begegnung — Erdpuls Müllrose Date: \_ **Season:** *Weather:* \_\_ Name: \_ **Patch location:** \_\_\_\_

**Page 2 (Observation):** The 13 Questions printed in condensed form, with lined space after each for notes. No boxes to circle — adults write freely.

**Page 3 (Data):** Measurement recording table: temperature, pH, moisture, infiltration time, life count. Plus a space for "Sensor Comparison" — what the Erdpuls dashboard shows for the nearest permanent sensor.

**Page 4 (Reflection and Action):** "What does this soil need?" "How does this compare to the soil in my own garden/allotment/yard?" "One thing I will do differently:" "One question I want to investigate further:"

### Welcome and Framing (15 minutes)

Gather at the garden edge. The framing for adults is different from children — it starts from practical relevance and moves toward the philosophical, rather than the reverse.

"Most of us who garden or grow food have a relationship with soil that is primarily instrumental — we add things to it, we plant things in it, we assess whether it's 'good' or 'bad' for our purposes. Today we're going to slow down and meet the soil on its own terms. Not 'what can this soil do for me?' but 'what is this soil, and what is it already doing?'

The method comes from Goethean science — Johann Wolfgang von Goethe, the poet, was also a serious natural scientist. His approach was simple and radical: observe carefully and completely before you explain. Let the phenomenon show itself. We'll spend the first hour doing nothing but observing, with all our senses. Then we'll bring in the instruments and the data. The tension between what your hands tell you and what the sensor tells you is where the real learning happens."

For **families with children:** "Children are welcome at every stage. They often see and smell things adults have trained themselves to ignore. Let them lead some of the observations."

*Proxemic note for the facilitator:* Adults have the most rigid proxemic boundaries of any target group. The workshop will ask them to kneel on the ground, press soil between their fingers, and bring it to their nose — intimate proxemic behaviors they may not have performed since childhood. The facilitator's key move: model it first, naturally, without commentary. Kneel, handle the soil, smell it, describe what you perceive. Adults follow modeled behavior more readily than verbal instruction when proxemic boundaries are involved. Do not announce "Now we're going to smell the soil!" — simply do it yourself, describe what you notice, and invite them to join.

### The Experience (90 minutes)

Adults work individually or in pairs (families work as a unit). Each selects or is assigned a patch. The facilitator reads the questions aloud, one at a time, with 5–8 minutes between each for observation and recording.

**Questions 1–5 (Sensation):** These proceed as in Appendix A. The key facilitation move for adults is resisting the urge to explain. When an adult says "I think this is clay because it's sticky," the facilitator responds: "That's an interpretation. First, describe the stickiness. What does it feel like? What does it remind you of?" Adults find this discipline more challenging than children do, because they have more habits of premature categorization.

**Question 5 (Smell):** This is often the breakthrough moment for adults. Many have never deliberately smelled soil. The facilitator can share: "The smell of healthy soil — that 'rain on earth' smell — is a chemical called geosmin, produced by beneficial soil bacteria. When you enjoy that smell, you're detecting biological health at a distance."

*Proxemic note:* Question 5 is consistently the proxemic breakthrough of the adult workshop. It requires bringing the soil to within centimeters of the nose — deep intimate distance with a non-human substance. This is the moment where the adult proxemic barrier dissolves. Hall identified the olfactory code as the most intimate proxemic channel: it operates only at close range and triggers the deepest associative responses. Allow extended time for the responses that follow — adults often surprise themselves with memories and associations they did not expect.

**Question 6 (Structure):** For gardening adults, this is where the experience connects to practice. "The aggregate structure you're seeing is built by earthworms, fungi, and roots over years. Every time we till, we break this architecture. Whether that's appropriate depends on context — but now you know what you're breaking."

**Question 7 (Life Count):** Adults are often as astonished as children. Provide the hand lens. Encourage them to take their time. If anyone identifies an organism by name, invite them to share with the group — but emphasize that "small brown beetle" is as valid an observation as "*Carabid ground beetle*."

**Question 8 (Water/Infiltration):** This has immediate practical significance for gardeners. "If water pools on your garden bed for more than 30 seconds, you have a compaction or structure problem. If it disappears in under 5 seconds, you may have drainage that's too fast to retain moisture. Your soil just told you something you can act on."

**Question 8b (Sound — Proxemic Enrichment):** "Lower your ear close to the ground — within a few centimeters of the soil surface. What can you hear? Now stand up slowly. What sounds disappeared? What new sounds appeared?" This exercise completes the full sensory circuit and provides a concrete proxemic experience: the world literally sounds different at different distances. For adults, this is often a moment of genuine surprise — they realize they have never listened to soil. The proxemic contrast (ear-to-ground vs. standing) makes the concept of sensory distance tangible.

**Questions 9–10 (Roots and Layers):** Adults can handle the full complexity. The facilitator can introduce horizon terminology if the group is interested (O-horizon, A-horizon, B-horizon) but should frame this as vocabulary for what participants have already observed, not as prior knowledge they should have had.

**Proxemic bridge — the Repair Café connection:** When introducing the closing reflection, the facilitator can make explicit: "In the Repair Café, you hold a broken toaster in your hands, diagnose its problem with all your senses, and repair it. Today you held soil in your hands, diagnosed its condition with all your senses, and asked what it needs. The proxemic pattern is identical: intimate distance with a material, multi-sensory diagnosis, care. The circular economy ethic operates the same way above and below ground."

**Question 11 (History):** This is where local knowledge enriches the experience. If any participant has lived in the area for decades, ask: "What was on this ground before? What was this part of the campus used for? When did the garden begin?" Oral testimony becomes longitudinal data.

**Question 12 (Relationships):** Encourage participants to physically stand up and look around from their patch. "Your patch doesn't exist alone. It receives water from uphill, shade from that wall, organic matter from that tree. It is a node in a network."

**Question 13 (Care):** For adults, this question has real-world application. "Based on everything you've observed — not what the internet says, not what the garden center recommends — what does this specific soil, in this specific spot, need from you?" Answers should emerge from the evidence gathered, not from general gardening advice.

### **Sensor Dialogue (20 minutes)**

Bring the group together. Display the Erdpuls dashboard.

For adults, the sensor dialogue goes deeper than for children. Key discussion points:

- **Resolution vs. Integration:** "The sensor takes a reading every 5 minutes at a single point. Your hand integrates temperature, texture, moisture, and structure simultaneously across a whole area. The sensor has temporal resolution; your body has spatial and multi-sensory resolution."
- **What the sensor misses:** "No sensor measures soil smell, soil structure, or biodiversity. These are properties only a human observer can assess. Your observations today are not a substitute for sensor data — they are a *complement* that the sensors cannot provide."
- **Trends vs. snapshots:** "Your visit today is a snapshot. The sensor has been running for months. Show me the temperature graph over the past week. How does today's reading relate to the trend? What happened three days ago that changed the moisture level?"

This positions citizen science observation and IoT monitoring as genuinely complementary — not as a "real science vs. amateur" hierarchy.

### Citizen Science Output

Each participant's notebook becomes a data point in the Erdpuls soil observation record. Specifically:

- Life Count data (organism type and count) entered into the seasonal biodiversity log
- Infiltration time and texture assessment compared with previous visitors' observations of the same patches
- Any identifiable species photographed and uploaded to iNaturalist
- New observations that surprise the facilitator flagged for follow-up by the Erdpuls research team

**For home application:** The "Reading Your Soil" laminated reference card goes home with each participant. They are encouraged to repeat the protocol in their own garden and share results at the next Open Makerspace Day or Repair Café. This creates a distributed soil observation network across the Müllrose area — citizen science at its most organic.

### Closing and Reflection (20 minutes)

Gather in a circle, ideally sitting on the ground. Tea or coffee if available. Seasonal snack from the garden (herbs, dried fruit, bread with garden-grown pesto — whatever is available; this grounds the experience in the garden's productivity).

*Proxemic note:* The closing circle is strongly sociopetal — everyone facing inward, at personal distance, with shared food and drink as mediating objects. This arrangement is the proxemic counterpart to the sociofugal dispersal during the observation phase (individuals at separate patches). The transition from dispersed to gathered is itself a pedagogical moment: "We went out alone into the soil. Now we bring what we found back to each other." The warm beverage and food activate olfactory and thermal channels that were focused on soil during the workshop — redirecting them toward human community.

Each participant shares: - One thing the soil showed them that they hadn't expected - One thing they'll do differently at home

The facilitator closes by connecting to the wider pattern-discovery framework: "What you did today is what we call Ring 2 of the pattern-discovery process — encountering the garden and near landscape. Each of your observations is a candidate for a *pattern* — a recurring relationship that makes this place alive. If you return in another season, or if you do this in your own garden, you're extending that pattern language."

## Follow-Up and Continuation

- **Open Makerspace Day:** Bring your home soil sample to compare with the campus soil.
- **Repair Café connection:** "You know how in the Repair Café we ask 'Can this be repaired?' Today you learned to ask the same question about soil. Compacted soil can be repaired. Depleted soil can be repaired. The repair ethic extends below our feet."
- **Sensor-building follow-up (Zone C):** Participants interested in continuous monitoring can attend a sensor-building workshop to construct a soil moisture and temperature sensor for their own garden, connected to the openSenseMap network.
- **Seasonal return:** Explicit invitation to repeat the protocol in a different season. The comparison data is the most valuable citizen science output the program generates.

## Token Economy Integration

Activity	Token Element
Completing the Soil Explorer Notebook	Cooperation
Sharing home garden data at Open Makerspace Day	Reciprocity
Returning for seasonal repeat	Cooperation + Regeneration
Building a home soil sensor (Zone C follow-up)	Reciprocity + Mutualism
Contributing data to the Erdpuls soil record	Mutualism
Implementing a soil-care action at home and reporting results	Regeneration

## Facilitator Notes

**BNE Qualification Requirements (Areas 6.1.1/6.1.2 — minimum: one of the following):** Facilitator should hold either (6.1.1) formal qualifications in environmental education, adult education, horticulture, biology, or a related field, or (6.1.2) demonstrated personal qualification: minimum 3 years facilitating experiential workshops for adult community audiences, plus Erdpuls facilitator induction including personal extended practice of the Goethean soil observation protocol. The facilitator must be



comfortable modeling intimate proxemic behavior with soil in front of adult groups — the key pedagogical move in this guide. Familiarity with allotment and home gardening practices is a practical asset.

**Pre-Workshop Participant Preparation (Area 3.3.1):** Send to registered participants at least 5 days before the workshop: (a) a short welcome note explaining what to wear (comfortable outdoor clothing, closed shoes suitable for garden work, clothes that can get dirty); (b) one question to reflect on beforehand: "If you were to describe the soil in your own garden or nearest green space, what would you say about it?"; (c) for families: a child-friendly activity — "Before you come, dig a small hole in your garden or a local park and write down three things you notice." No specialist knowledge is required or assumed.

**Post-Workshop Follow-Up Resources (Area 3.3.3):** Provide to participants after the workshop: (a) the laminated "Reading Your Soil" reference card (distributed at the closing circle — this is the primary take-home resource); (b) a digital "Home Soil Protocol" — a simplified 6-question version of the 13 Questions for independent use in their own garden, formatted as a printable PDF; (c) the date of the next Open Makerspace Day with invitation to bring a home soil sample for comparison; (d) instructions for contributing home observations to the Erdpuls distributed soil network (simple form or email submission); (e) the Erdpuls soil sensor dashboard URL for participants to track campus soil data over time and compare with their own.

**Key difference from children's guide:** Adults bring prior knowledge — some accurate, some not. The facilitator should welcome knowledge ("Yes, that's a great observation about clay structure") while gently redirecting premature conclusions ("Before we decide why, let's finish describing what we see"). The Goethean discipline of observation-before-interpretation is harder for adults than for children, and more transformative when achieved.

**Families:** When children and adults observe together, the children often notice things adults miss (small creatures, subtle colors, unusual smells). Framing the child as a co-scientist, not a tag-along, enriches the experience for both.

**Gardening experts in the group:** These participants may already know a great deal about soil. The facilitator should honor their expertise while noting: "Your knowledge is about soil *management*. Today we're practicing soil *encounter* — letting the soil speak before we act. Even experts can be surprised."

## Seasonal Variations

As in Guide 1, with the following adult-specific additions:

Season	Adult-Specific Focus
Spring	Garden planning: "What is your soil telling you about what to plant where?" Directly applicable timing.

Season	Adult-Specific Focus
Summer	Drought and heat stress: "How is your soil coping? Where is moisture held and where is it lost?" Water management relevance.
Autumn	Composting and mulching: "The decomposition you see here is the same process your compost pile uses. What conditions support it?"
Winter	Soil rest: "The soil is not dead — it's dormant. What's happening below the surface that you can't see?" Connects to patience and seasonal rhythm.

## Risk and Safety

As in Guide 1. Additional for adults: some participants may have mobility limitations or chronic pain that makes kneeling difficult. Provide a folding stool or offer a standing observation at a raised garden bed as an alternative. The protocol works at any height — the Questions can be addressed to soil in a container if necessary.

## Proxemic Design Notes

**The adult proxemic barrier and its dissolution:** This guide's most important proxemic challenge is the initial resistance of adult participants to intimate-distance engagement with soil. Adults have spent decades calibrating their proxemic boundaries for human-to-human interaction; this workshop asks them to apply intimate-distance behavior to a non-human substance. The facilitator's modeled behavior is the primary tool for overcoming this barrier (see proxemic note in Welcome and Framing above). The smell question (Question 5) is consistently the moment where the barrier dissolves — once an adult has brought soil to their nose, the remaining intimate-distance activities proceed naturally.

**Families as proxemic units:** When families participate together, the parent-child proxemic relationship transforms the dynamic. Children who might be shy alone are emboldened by a parent's presence. Parents who might resist kneeling in the dirt do it because their child is doing it. The family operates as a proxemic unit with its own internal comfort zone — and that zone is more flexible than either individual's. Frame accordingly: "Work together. Let your child's hands guide yours."

**The sensor dialogue as proxemic shift:** The transition from field observation (intimate/personal distance, all channels active) to sensor comparison (social distance, vision-only) risks an engagement drop. Scaffold by passing soil samples during the discussion and keeping the tablet/display low enough that participants can lean in together (personal rather than public distance).

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# Questions to the Soil — Guide

## 3: Boden-Gedächtnis

*For Elders and Intergenerational Groups*

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## Guide 3: Boden-Gedächtnis — The Soil's Memory

### For Elders and Intergenerational Groups

#### Overview

<b>Title</b>	Boden-Gedächtnis / The Soil's Memory / Pamięć Gleby
<b>Target Group</b>	Older residents of Müllrose and the Oder-Spree region, ideally paired with younger participants (school-age or young adults) for intergenerational exchange
<b>Group Size</b>	8–16 (ideally equal numbers of older and younger participants)
<b>Duration</b>	2.5–3 hours (morning format preferred, with Kaffee und Kuchen break)
<b>Location</b>	Erdpuls campus garden (Zone B) and one or two off-campus comparison sites meaningful to elder participants (e.g., a former allotment area, a field edge they remember from childhood)
<b>Season</b>	Autumn is ideal (the memory/decomposition/accumulation metaphor is strongest); spring also works well (awakening/return)
<b>Learning Objectives</b>	By the end of this workshop, participants will: (1) articulate at least three specific soil memories from their lifetime and place them in relation to present-day observable soil conditions at the observation site; (2) identify, with their intergenerational partner, at least one measurable environmental change (water table, species presence/absence, soil color or texture, flood pattern) observable across their lifetime in this landscape; (3) contribute documented oral soil history testimony — a minimum of 300 words of transcribed narrative linked to specific Questions — to the Erdpuls Soil Memory archive, subject to consent; (4) name at least one quality of soil stewardship from their lived experience that they would pass to the younger generation, recorded in their own words

<b>Sustainability Dimensions</b>	<b>Ecological</b> (longitudinal change in soil health across decades; biodiversity loss and gain; water system changes; climate-related landscape shifts observed through living memory); <b>Economic</b> (DDR agricultural collectivization vs. post-reunification land practices; subsistence growing as economic resilience model; memory of soil productivity across economic systems); <b>Social</b> (intergenerational knowledge transfer as community practice; elder dignity through recognized expertise; community memory as educational resource); <b>Cultural</b> (oral history as cultural preservation; <i>Heimatkunde</i> and <i>Schulgarten</i> as DDR-era educational heritage; local landscape as cultural commons)
<b>SDG Links</b>	<b>SDG 4</b> (Quality Education — intergenerational co-teaching; oral history as legitimate research methodology; lifelong learning across all ages); <b>SDG 11</b> (Sustainable Cities and Communities — community memory as planning resource; intergenerational social cohesion in the Müllrose region); <b>SDG 15</b> (Life on Land — longitudinal biodiversity data recoverable only from living memory; historical ecology of the Oder-Spree landscape)
<b>4A-Pathway Focus</b>	Acknowledgment ("I recognize my lifelong relationship with this ground") and Attitude (intergenerational responsibility)
<b>Unique Value</b>	Elders as knowledge-holders, not recipients. Their memory IS longitudinal data.
<b>Methodological Foundations</b>	Oral history methodology (Thomson, 1990; Portelli, 1991): personal memory testimony constitutes legitimate historical and environmental research data. Intergenerational learning theory (Kaplan, 2002): structured exchange between age cohorts as mutual enrichment, not one-directional transmission. Historical ecology (Foster & Aber, 2004): long-term human observation as empirical basis for ecological understanding of place-change.

### The Core Principle: Elders as Scientists

This guide inverts the conventional educational relationship. In most workshops, the facilitator holds the knowledge and transmits it to participants. In this guide, the elder participants hold knowledge that no facilitator, no textbook, and no sensor can provide: decades of embodied experience with this specific landscape. They remember what the soil used to be like. They remember what grew where. They remember the floods, the droughts, the changes in farming practice, the buildings that stood and fell. This memory is scientific data — longitudinal, place-specific, experientially grounded.

The younger participants bring a different capacity: comfort with instruments, fresh eyes unhabituated to the landscape, and energy for physical tasks (digging, walking to comparison sites). The exchange between these capacities is the pedagogical engine.

The Questions to the Soil protocol, in this guide, becomes a framework for structured intergenerational dialogue, with the soil as the shared text that both generations read — differently, and therefore more completely.

**The proxemic structure of intergenerational exchange:** Hall's proxemics reveals the spatial architecture of this guide's core mechanism. When the younger partner kneels to dig and the elder sits in a chair directing the work, the typical age-power vertical proxemic relationship is inverted: the elder is above, the authority; the youth is below, the hands. This arrangement communicates respect through spatial positioning — a proxemic signal that reinforces the guide's principle without requiring any verbal declaration. The soil sample, passed from the digger's hands to the elder's lap, is the mediating object that maintains intimate proxemic connection between the generations. The elder does not need to kneel to be in intimate relationship with the soil — the soil comes to them.

### Preparation and Materials

As in Guide 2, plus: - A recording device (smartphone or dedicated recorder) with elder participants' consent for oral history capture - Printed historical photographs of the Erdpuls campus site and surrounding area, if available - A large-format map of Müllrose (current and historical if available) for the closing exercise - Comfortable seating (folding chairs or benches) at the observation sites — elders should be able to sit while observing - Kaffee und Kuchen supplies for the mid-session break

**Critical preparation:** Contact elder participants in advance. Explain the format. Ask them: "Can you think of a place in or around Müllrose where the soil has changed during your lifetime? A place that used to be different?" Their answers may suggest comparison sites for the workshop.

### Welcome and Framing (20 minutes)

Gather at the Zone E Heritage & Community Hub threshold, with seating available.

"Today is about memory — the soil's memory and yours. Soil records everything that happens to it: every rain, every drought, every plowing, every footstep, every root, every worm. But soil records slowly and silently. It takes a human being who has lived with this soil for decades to read its story.

Each of you who has lived in this region carries a soil memory that is as valuable as any sensor reading. You remember what this garden used to be. You remember what grew in the fields around Müllrose before reunification. You remember how the water behaved, how the seasons felt, what the land smelled like.

Today we bring two kinds of knowledge together. [To the younger participants:] You will dig, measure, count, and record. [To the elder participants:] You will remember, compare, narrate, and interpret. Neither kind of knowledge is complete without the other."

Form intergenerational pairs or small groups (1–2 elders with 1–2 younger participants).

## The Experience (90 minutes)

The 13 Questions proceed as in the main protocol, but each question is followed by an **Elder Memory Prompt** — a question specifically designed to unlock longitudinal observation.

**Question 1 (First Impression):** *Elder Memory Prompt:* "When you first see this patch of ground, what does it remind you of? Is there a place from your past that had soil like this?"

**Question 3 (Color):** *Elder Memory Prompt:* "Has the soil in this area always been this color? Do you remember it being darker, lighter, redder, sandier? What might have caused the change?"

**Question 4 (Touch/Texture):** *Elder Memory Prompt:* "When you were young, did you handle soil regularly? In the garden, on the farm, at school? What did soil feel like in your childhood — was it different from how this feels now?"

**Question 5 (Smell):** *Elder Memory Prompt:* "Smell is the sense most connected to memory. Does this soil smell remind you of anything specific — a place, a person, a time? What soil smells do you remember from your life?"

This question often produces the most extraordinary responses. Elders have described the smell of their grandmother's potato field, the particular odor of the sandy soil by the Schlaube after rain, the difference between the heavy clay soil west of Müllrose and the lighter soil to the east. These are phenomenological data points of irreplaceable value.

*Proxemic note — the olfactory-mnemonic link:* Hall identified the olfactory code as the most intimate proxemic channel — it operates only at close range and triggers the deepest associative responses. When elders smell soil, something extraordinary happens: the intimate proxemic encounter with the soil activates memories stored at the same intimate distance across decades. The elder is simultaneously in intimate proxemic relationship with the present soil *and* with the remembered soil of sixty years ago. This temporal extension of the proxemic field — memory carrying touch, smell, sound, and thermal sensation across time — is the elder guide's unique contribution. It cannot be rushed. Allow extended time for whatever emerges. Record it. These are the protocol's deepest data.

**Question 7 (Life Count):** *Younger participants dig and count. Elder participants observe and compare.* *Elder Memory Prompt:* "Were there more or fewer soil creatures when you were young? Do you remember particular insects or worms? Has anything disappeared that used to be common? Has anything appeared that wasn't there before?"

**Question 8 (Water/Infiltration):** *Elder Memory Prompt:* "How did water behave in this area when you were young? Were there floods? Dry summers? Has the drainage changed? Were there ditches, streams, or wet areas that no longer exist — or new ones that appeared?"

**Question 10 (Layers):** *Elder Memory Prompt:* "If we dig deeper — below what we can see today — what do you think we'd find? Was there ever a road here? A building? A bomb crater? What layers of history are under our feet?"



**Question 11 (History):** This becomes the centerpiece for the intergenerational exchange. The younger participant records while the elder narrates. The prompt is open: "Tell me everything you know about what has happened on this ground — or ground like it — during your lifetime."

**Question 13 (Care):** *Adapted:* "If you were advising your grandchild on how to take care of this soil for the next fifty years, what would you say? What mistakes should they avoid? What wisdom from your experience should they carry forward?"

### The Memory Break (20 minutes)

Kaffee und Kuchen. Seated. This is not incidental — it is a structured space for informal storytelling. The experience of handling soil together, of kneeling and looking and smelling, often opens memories that only emerge in unstructured conversation. The facilitator listens, notes, but does not direct.

*Proxemic design:* The Kaffee und Kuchen break is strongly sociopetal by design: circular seating, shared food, warm beverages, close physical proximity. Hall's research showed that shared meals are among the most powerful sociopetal mechanisms in any culture — they draw people into personal and intimate proxemic distance through the mediating objects of food and drink. All sensory channels reactivate: the smell of coffee, the warmth of the cup in the hand, the taste of cake, the sound of quiet conversation. The break is not a rest from the workshop — it is a proxemically designed space where informal knowledge exchange occurs that the formal protocol cannot force. Many of the most valuable elder memories emerge here, when the structured questioning has ended and the proxemic warmth of shared food has opened a different kind of attention.

### Sensor Dialogue (15 minutes)

The sensor dialogue for this group has a specific focus: **temporal comparison**. Show the Erdpuls dashboard's historical data — temperature trends over months, moisture patterns, seasonal cycles.

"The sensors have been recording for [X months/years]. But your memories are a sensor that has been recording for sixty, seventy, eighty years. The electronic sensor says soil temperature has averaged [X] this year. What do your memories say? Was it warmer when you were young? Colder? Different?"

If any historical climate or agricultural data for the region is available (e.g., from the DWD — Deutscher Wetterdienst), display it alongside the elder testimony. The convergence or divergence between official records and lived memory is itself a rich discussion.

### Citizen Science Output

This guide produces a unique form of citizen science output: **oral soil histories**.

With participants' consent, the recorded elder narratives are transcribed (by younger participants or volunteers) and entered into the Erdpuls archive as "Soil Memory Records." Each record includes: - The elder's name (or pseudonym if preferred) and age - The date and location of the observation - The specific memories shared, linked to the relevant Question - Any historical photographs or documents the elder can provide - The sensor and observation data from the intergenerational partner

These Soil Memory Records complement the instrumental data in a way no other citizen science format can. They are longitudinal, multi-sensory, culturally embedded, and irreplaceable. When an elder who remembers the 1950s soil is paired with sensor data from 2026, the resulting record spans seven decades of place-knowledge.

### Closing and Reflection (20 minutes)

Return to the Heritage Hub (Zone E). The facilitator spreads the large-format Müllrose map on the table.

"We've been looking at soil through a 10-cm hole today. Now let's zoom out. On this map, can each pair mark the places where your soil memories come from? The allotment you tended, the field you walked through, the garden your grandmother kept."

Each pair places a mark and shares a one-sentence memory. The map fills with memory-points — a collective soil cartography of Müllrose that exists nowhere else.

The facilitator photographs the annotated map for the archive and connects to the broader toolkit: "This is the beginning of a pattern language for Müllrose's soil. Each of your memories is a pattern — a relationship between people and ground that sustained life in this place. Some patterns have been lost. Some persist. Some are waiting to be renewed."

### Token Economy Integration

Activity	Token Element
Sharing soil memories (elder)	Reciprocity (knowledge flows to younger generation)
Recording and transcribing memories (younger participant)	Reciprocity (skill flows to elder generation)
Contributing Soil Memory Record to the archive	Mutualism
Returning for seasonal repeat	Cooperation + Regeneration
Providing historical photographs or documents	Mutualism
Implementing a soil-care recommendation at home based on elder advice	Regeneration

The token economy has a particular significance for elder participants: it formally recognizes their knowledge as a *contribution*, not a pastime. The token represents the community's acknowledgment that memory is labor, knowledge is value, and sharing is an act worthy of reciprocal recognition.

## Facilitator Notes

**BNE Qualification Requirements (Areas 6.1.1/6.1.2 — minimum: one of the following):** Facilitator should hold either (6.1.1) formal qualifications in gerontology, oral history, adult or community education, environmental education, or social work, or (6.1.2) demonstrated personal qualification: minimum experience facilitating intergenerational or elder-focused community programmes, plus Erdpuls facilitator induction and personal practice of the full protocol. Specific required competencies: oral history interview facilitation skills (including ethical practice around consent and sensitive material); capacity to hold space for emotionally charged content (displacement, loss, wartime memories); physical accessibility planning. A co-facilitator is strongly recommended, particularly one who can provide physical support and accompany elders on off-campus site visits.

**Pre-Workshop Participant Preparation (Area 3.3.1):** Contact elder participants personally — by phone wherever possible, not just email — at least one week before the workshop. Explain what will happen in accessible language: "We'll be outside in the garden for about an hour, then inside for coffee and a discussion. You can sit the whole time. We'll be asking what you remember about the land around Müllrose." Ask them: "Can you think of a place in or around Müllrose where the soil or landscape has changed during your lifetime?" Their answers may suggest comparison sites and prime their memory for the observation. Inform accompanying teachers, social workers, or family members about the format, duration, accessibility provisions, and the emotional-content dimension (soil memories can connect to difficult history).

**Post-Workshop Follow-Up Resources (Area 3.3.3):** Provide to all participants after the workshop: (a) a printed transcript of their contributed oral history narrative (sent to elder participants by post within 3 weeks, with a copy to the archive if consent was given); (b) an annotated copy of the Müllrose memory map with each pair's marked locations; (c) an invitation to a follow-up "Soil Memory Reading Evening" — an informal community event where selected narratives are read aloud (planned for winter, see Cross-Guide Reference below); (d) the Erdpuls Soil Memory archive link, where participants can see their contribution alongside others; (e) younger participants receive: the full transcribed record from their elder partner, with a suggested follow-up exercise — "Find one place your partner mentioned and visit it. Write three sentences about what you observe."

**Pacing:** This guide runs slower than the others. Elders may need more time to settle into the sensory exercises, and their stories — once started — should not be truncated. Build in generous buffer time. If the full 13 Questions cannot be completed, that is acceptable; the quality of the intergenerational dialogue matters more than protocol completeness.

**Physical accessibility:** Not all elders can kneel or dig. Provide seating, offer to hold soil samples at a comfortable height, and ensure the younger partner does the physical work while the elder directs and interprets. The protocol works perfectly well with the elder seated beside the observation patch.

**Emotional content:** Soil memories can be emotionally charged — connected to war, displacement, loss, hunger, or joy. The facilitator should be prepared for strong feelings and hold space without redirecting. A story about the garden that fed a family during wartime is both a soil observation and a human testimony.

**Language:** Many elder participants in the Oder-Spree region may have limited formal education but profound practical knowledge. Avoid academic terminology. The language of the questions is already accessible; the elder memory prompts should be even more so. "Tell me about the soil when you were young" is better than "Describe the pedological changes you've observed over your lifetime."

**Consent for recording:** Always ask. Some elders will be delighted to be recorded; others will prefer that their stories stay in the room. Both choices are respected.

### Proxemic Design Notes

**Physical accessibility as proxemic accommodation:** Not all elders can kneel. The response — bringing soil to them in wide bowls or trays at table height — is a proxemic translation: instead of moving the person into intimate distance with the ground, move the ground into intimate distance with the person. Ensure adequate lighting (visual channel degrades with age) and speak clearly while facing the person (auditory channel degrades with age). The protocol's proxemic richness is fully preserved when the soil is at hand height in a comfortable chair — what changes is the body's position, not the sensory engagement.

**The closing map exercise as proxemic expansion:** The workshop moves from intimate distance (soil in hands, soil at nose) to social/public distance (leaning over a map of Müllrose, placing memory-points across a territory). This is the Ring 0 → Ring 3 expansion compressed into a single session. The map table should be low enough and large enough that all participants can lean over it, reach it, and touch it — maintaining personal-distance engagement with the territory-as-representation. If participants are seated in rows facing a projected map, the exercise will lose the haptic proxemic quality that makes it powerful.

**Pacing and proxemic tempo:** This guide runs at a slower proxemic tempo than the others. The transitions between zones (intimate soil encounter → social Kaffee und Kuchen → personal map exercise) should be gradual. Abrupt shifts jar elderly participants who need time to adjust — physically and attentionally — to a new proxemic arrangement. Allow transition time: "Let's put the soil aside now and move inside for coffee" is better than immediate relocation.

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# Questions to the Soil — Guide 4: Boden-Tiefe

*For Artists and Researchers (Residency-Depth Immersion)*

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## Guide 4: Boden-Tiefe — Soil Depth

### For Artists and Researchers (Residency-Depth Immersion)

#### Overview

<b>Title</b>	Boden-Tiefe / Soil Depth / Głębia Gleby
<b>Target Group</b>	Artists-in-residence, visiting researchers, citizen science fellows, bio-material practitioners
<b>Group Size</b>	1–6 (intimate; often solo with facilitator introduction)
<b>Duration</b>	Multi-day immersion: initial guided session (3–4 hours) + self-directed repeat observations over the residency period (1–4 weeks)
<b>Location</b>	Full campus and surrounding landscape; the resident chooses their own primary observation site
<b>Season</b>	Any; the seasonal arc experienced during the residency becomes part of the work
<b>Learning Objectives</b>	By the end of this residency engagement, participants will: (1) demonstrate sustained daily soil observation practice over a minimum of 7 consecutive days, evidenced by a weekly log showing measurable progression in the specificity and depth of perception from Day 1 to Day 7+; (2) formulate at least one original research question or artistic concept that emerged directly from the soil encounter practice, documented with reference to specific observations that prompted it; (3) produce a combined interpretation of their chosen site's ecological character integrating sensor data and bodily observation, identifying where the two data sources converge and where they diverge; (4) contribute at least one substantive output — creative work, longitudinal dataset, method documentation, or workshop design — to the Erdpuls knowledge commons, attributed and archived

<b>Sustainability Dimensions</b>	<p><b>Ecological</b> (deep-time ecological understanding through repeated observation; phenological attention to soil change across weeks; biodiversity documentation at micro-scale; soil as living system in continuous flux);</p> <p><b>Economic</b> (artist and researcher residency as sustainable creative economy model; bio-material practice as circular economy; residency knowledge contribution as non-monetary economic exchange); <b>Social</b> (open studio and public event as community engagement; methodological knowledge transfer to future residents and facilitators; the resident as a bridge between research/ arts community and local community); <b>Cultural</b> (Goethean natural science as European cultural and intellectual heritage; soil art as materialist-ecological practice with deep roots; citizen science as scholarly contribution across disciplinary traditions)</p>
<b>SDG Links</b>	<p><b>SDG 4</b> (Quality Education — research methodology development and sharing; Goethean epistemology as alternative to extractive research paradigms; OER contribution); <b>SDG 15</b> (Life on Land — longitudinal micro-ecological study; soil biodiversity inventory; phenological dataset contributing to long-term monitoring); <b>SDG 17</b> (Partnerships for the Goals — interdisciplinary and cross-sector collaboration; knowledge commons contribution; residency as model for arts-science-community partnership)</p>
<b>4A-Pathway Focus</b>	Full pathway, with deepest engagement at Acknowledgment (artistic/research integration of place-knowledge) and Action (creative or scientific output)
<b>Unique Value</b>	Depth of engagement over time; the production of original works (art, research, material experiments) grounded in soil encounter
<b>Methodological Foundations</b>	Goethean phenomenology and participatory science (Bortoft, 1996; Naydler, 1996): intensive dwelling-in-phenomena as the epistemological method for developing new organs of perception. Longitudinal ecological observation (Likens, 1989): systematic repeated measurement at the same site as the basis for detecting change and pattern. Ecological art practice (Wallen, 2012): artistic engagement with ecological systems as a form of environmental research, producing knowledge that scientific frameworks alone cannot generate.

## The Residency Context

The Erdpuls artist and research residency offers immersive engagement with the campus and its landscape. Residents live on-site, often for one to four weeks. They arrive with a project — bio-material research, citizen science investigation, conservation practice, artistic exploration — and the Questions to the Soil protocol is offered as a foundational practice that grounds their project in direct, sustained encounter with the place.



Unlike the other guides, this one is not a single-session workshop. It is a protocol for ongoing practice — a daily or regular discipline that deepens over the residency period. The initial facilitated session introduces the method; the resident then carries it forward independently, adapting it to their particular practice.

### **Initial Session: Facilitated Introduction (3–4 hours)**

**Part 1 — Site Selection Walk (45 min):** The facilitator walks the full campus with the resident. No agenda beyond: "Where does the ground interest you? Where do you feel drawn to kneel?" The resident selects their primary observation site — a patch they will return to repeatedly throughout the residency. The choice is theirs; the facilitator may suggest alternatives only if the chosen site presents safety or access issues.

*Proxemic note:* This walk is itself a proxemic exercise — the resident is moving from public distance (the campus overview, the arrival, the unfamiliar place) toward personal and intimate distance (finding *the* spot where they want to kneel). The instinct to kneel at a particular location is a proxemic recognition: "This is where I want to enter intimate relationship with the ground." The facilitator should not rush this process. The quality of the entire residency depends on the resident finding a site that draws them into proxemic closeness — not one that was assigned.

**Part 2 — Full 13 Questions (90 min):** The facilitator guides the resident through the complete protocol at their chosen site, at the full depth described in Appendix A. No simplification, no rushing. The facilitator reads each question aloud, then is silent while the resident observes and records.

Recording for this group is more expansive than for other target groups. The resident is encouraged to use whatever medium feels natural: - Written observation (notebook, structured or freeform) - Drawing (pencil, ink, watercolor, charcoal) - Photography (macro, documentary, artistic) - Sound recording (soil soundscape, crunching, water infiltration, wind through nearby plants) - Material collection (with permission: soil samples for pigment extraction, clay for ceramic work, plant material for bio-material research) - Measurement (full sensor suite: temperature at multiple depths, moisture, pH, conductivity if available)

**Part 3 — Sensor Deep-Dive (30 min):** For residents, the sensor dialogue goes beyond comparison. The facilitator provides: - Access to the raw Erdpuls sensor data for the nearest station (CSV export or API access) - Historical data for the period preceding the residency (at least one full season if available) - Technical documentation for the sensor types in use - Invitation to install a temporary sensor at the resident's chosen site if desired (via Zone C resources)

**Part 4 — Conversation (30 min):** An open dialogue between facilitator and resident about how the soil encounter connects to their project. This is not structured by questions but by genuine curiosity: How does what you observed today change what you planned to make/research/investigate? What questions has the soil raised that your project didn't anticipate?

## The Ongoing Practice

**Daily Minimum (15–20 min):** The resident returns to their chosen site at the same time each day. They do not repeat the full 13 Questions every time. Instead, they practice a condensed version:

*Three Morning Questions:* 1. What is different today from yesterday? (Attend to change: light, moisture, temperature, life activity, smell) 2. What is the same? (Attend to persistence: structure, color, depth, the abiding qualities) 3. What am I beginning to understand that I could not have seen on the first day? (Attend to the emergence of pattern through accumulated observation)

This daily practice is the core of the Goethean method adapted for residency: the same phenomenon, observed repeatedly, reveals its deep structure gradually. Goethe's insight was that the observer must change — must develop new organs of perception — in order to see what the phenomenon is showing. This takes time. A single session, however rich, cannot achieve what three weeks of daily return achieves.

*Proxemic note — the deepening trajectory:* The daily return to the same 1 m<sup>2</sup> of soil creates a proxemic relationship that evolves over weeks. Day 1 is novel — the resident enters intimate distance with unfamiliar ground. Day 7 is recognition — the ground begins to "know" the observer, and the observer begins to "know" the ground; specific textures, smells, and temperatures are anticipated before contact. Day 21 is intimate in the full relational sense — the observer detects changes by feel, smell, moisture on the hands; the soil has entered the personal proxemic field permanently. This progression mirrors the human proxemic trajectory of relationship: stranger → acquaintance → intimate. It is the deepest proxemic engagement the toolkit produces and the reason the residency format generates knowledge that no single-session workshop can match.

**Solitary observation as proxemic autonomy:** Some residents will prefer daily practice entirely alone. In proxemic terms, this is a preference for an unmediated intimate encounter with the phenomenon — no social proxemic interference from another human body in the same space. Another person's sounds, warmth, and movement introduce sensory information that competes with the phenomenon under observation. The Goethean method sometimes requires solitude precisely for this reason. The facilitator should ask early, respect the answer, and make themselves available without being intrusive.

**Weekly Deepening:** Once per week (suggested), the resident repeats the full 13 Questions at their primary site, recording in full. The accumulated weekly records become a longitudinal dataset that is both scientific (measurable changes over the residency period) and artistic/philosophical (the evolution of the observer's perception).

**Comparison Sites:** The resident is encouraged to select 2–3 additional sites for periodic comparison: a site with very different soil character, a site at a different position in the landscape (hilltop vs. valley, sun vs. shade, cultivated vs. wild), and a site beyond the campus boundary (to begin the Ring 2 → Ring 3 expansion). Comparison sharpens perception.

## The Creative/Research Integration

The protocol does not prescribe what the resident does with their soil encounter. But it does suggest points of integration:

**For bio-material artists:** The soil itself is a material palette. Clay extracted from different depths and locations has different color, texture, and firing properties. Soil pigments (ochres, umbers, siennas) can be extracted and used directly. The decomposition processes observed in Question 7 (Life Count) and Question 6 (Structure) are the same processes that bio-material practice harnesses. The Questions to the Soil become a sourcing protocol as well as an observation practice.

**For citizen science researchers:** The daily observation record, combined with sensor data, constitutes a micro-ecological study. The resident may formulate a research question during the residency ("Why does this 2 m<sup>2</sup> patch support 3x the biodiversity of the adjacent patch?") and design a follow-up investigation. The Erdpuls data infrastructure supports this.

**For conservation practitioners:** The protocol provides a baseline assessment methodology that can be applied to any site. The resident may develop a simplified version for their home context, or create training materials based on their experience.

**For writers, photographers, filmmakers:** The discipline of daily return produces material that cannot be generated in a single visit. The gradual shift in perception — from surface impression to structural understanding — is itself a narrative arc. Many residents find that the soil encounter becomes the through-line of their entire residency project, even if they arrived with a different plan.

## Citizen Science Output

Residency-depth engagement produces the most rigorous citizen science data in the Erdpuls system: - Multi-week longitudinal observation records (daily + weekly) - Sensor data from temporary installations at the resident's chosen site - Species inventories (if the resident has identification skills or uses apps consistently) - Photographic time-series (the same patch photographed daily from the same position) - Soil samples archived for future analysis (labeled, dated, stored in Zone B)

This data is entered into the Erdpuls archive under the resident's name and linked to their creative/ research output. The combination of scientific data and artistic interpretation is itself a novel form of publication — a pattern that other residency programs could adopt.

## Token Economy Integration

Activity	Token Element
Completing the initial facilitated session	Cooperation
Maintaining the daily practice (verified by log)	Cooperation + Regeneration

Activity	Token Element
Contributing sensor data from temporary installation	Mutualism
Producing a creative/research output that integrates soil encounter	Mutualism + Regeneration
Presenting findings at a public event or open studio	Reciprocity
Documenting the method for future residents	Mutualism

## Facilitator Notes

**BNE Qualification Requirements (Areas 6.1.1/6.1.2 — minimum: one of the following):** Facilitator should hold either (6.1.1) formal qualifications in environmental science, ecology, art or design, research methods, or conservation practice, or (6.1.2) demonstrated personal qualification: documented experience with contemplative or phenomenological practice in a natural science or artistic context, plus Erdpuls facilitator induction including personal extended practice of the full 13 Questions protocol across at least two seasons. The critical personal qualification for this guide is not subject expertise but *capacity to hold space for open-ended autonomous inquiry* — the ability to introduce the method thoroughly and then withdraw without redirecting the resident's emerging practice. The facilitator's own relationship with soil, place, and sustained attention is the most important qualification.

**Pre-Residency Preparation (Area 3.3.1):** Before the resident's arrival: (a) share the Erdpuls campus documentation pack, including campus map, Zone descriptions, site-access permissions, and sensor network overview, so the resident arrives knowing what infrastructure is available; (b) provide the "Residency Protocol Guide" PDF (a self-contained guide to the daily practice, weekly observation structure, and documentation formats); (c) schedule a 30-minute pre-arrival video call to discuss the resident's project, answer practical questions, and orient them to the sensor data portal; (d) arrange access to Zone C (Makerspace) for residents wishing to install temporary sensors — this requires advance coordination.

**Post-Residency Follow-Up Resources (Area 3.3.3):** After the residency closes: (a) archive all contributed datasets, observation logs, and outputs in the Erdpuls knowledge commons within 4 weeks, with the resident's preferred attribution; (b) provide the resident with a complete export of sensor data for their site and period, in CSV and PDF formats; (c) issue a "Residency Completion Letter" confirming participation and contribution — useful for the resident's portfolio, grant applications, and institutional reporting; (d) invite the resident to contribute a short reflection (one page or a 5-minute recorded conversation) for the Erdpuls "Resident Voices" archive — documenting how the soil encounter shaped their practice; (e) maintain contact with the option of a follow-up public event, virtual or in-person, where the resident can share their output with the Müllrose community.

**The facilitator's role changes over the residency.** On Day 1, the facilitator guides. By Week 2, the facilitator is a dialogue partner, checking in but not directing. By Week 3–4, the resident has internalized the method and the facilitator is a resource, not a guide. This withdrawal is intentional — the Goethean method requires that the observer develop their own relationship with the phenomenon, which cannot happen under continuous instruction.

**Artistic freedom:** The facilitator should not impose any expectation of what the creative output "should" look like. If a painter decides the soil encounter has changed their use of color but not their subject matter, that is a valid outcome. If a researcher abandons their original hypothesis because the soil showed them something more interesting, that is a valid outcome. The protocol serves the resident's practice, not the other way around.

**Solitude:** Some residents will prefer to conduct the daily practice entirely alone. Others will want periodic check-ins. Ask early, respect the answer, and make yourself available without being intrusive. (See the proxemic note on solitary observation in The Ongoing Practice above.)

### Proxemic Design Notes

**The residency as proxemic immersion:** This guide produces the deepest proxemic engagement in the entire toolkit because it operates over time. Where other guides produce a single intense intimate encounter (2–4 hours), the residency produces weeks of daily returns — accumulating proxemic depth that transforms the resident's relationship with the place. The Three Morning Questions are the proxemic instrument: each day's visit adds another layer of sensory familiarity until the resident can detect changes by feel alone.

**The facilitator's proxemic withdrawal:** On Day 1, the facilitator is present at personal distance — guiding, prompting, sharing. By Week 2, the facilitator has withdrawn to social distance — checking in, available but not directing. By Week 3–4, the facilitator is at public distance or absent — the resident has internalized the method and the proxemic relationship is between the resident and the soil, not between the resident and the facilitator. This progressive withdrawal is itself a proxemic design: it creates space for the resident's own intimate relationship with the phenomenon to develop without social proxemic interference.

**The open studio as proxemic re-expansion:** When residents present their work at a public event, the proxemic field expands from the intimate (resident-soil) back to the public (resident-audience). The challenge is maintaining the depth of the intimate encounter in the public presentation. Bring the soil into the presentation space. Have the resident demonstrate their daily practice. Let the audience touch, smell, and handle the same materials. This re-grounds the public-distance presentation in intimate-distance experience.

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