THE FUTURE MAP OF MY HOMETOWN

Feedback form link & QR code:
https://ecolise.eu/curiosoil-lesson-plan-form-EN

Subject: **Geography**
Duration: 45 minutes
Age group: secondary school students (ages 14–16)
Topic: Land use and soil in a local area
Connection to Curiosoil tools: -

LEARNING OUTCOMES

Knowledge

By the end of the lesson, students will:

- Explain the main soil functions (e.g., supporting plants, filtering water, providing a foundation for infrastructure) and connect them to local land uses. (activity 1)
- Recognize that soils are diverse, with different types supporting different land uses (e.g., farming, housing, recreation). (activity 3)
- Identify key soil threats (e.g., sealing, erosion, pollution, loss of biodiversity) and understand how these arise from competing land-use interests. (activity 2 and 3)
- Describe possible soil-friendly solutions, such as green infrastructure, sustainable farming, or land-use planning that reduces soil sealing. (activity 3 and 4)

Skills

By the end of the lesson, students will be able to:

- Interpret and compare maps (current, historical, and redesigned) to analyse how land use influences soil functions. (activity 1 and 3)
- Use symbols, legends, and colours to clearly represent land-use types and soil functions on maps. (activity 2 and 3)
- Analyse trade-offs between different uses of the same soil (e.g., farming vs. construction, recreation vs. conservation). (activity 2 and 3)
- Propose and visually design at least two interventions that improve or protect soil functions while balancing human needs. (activity 3)
- Communicate soil-related issues through discussion, mapping, and short written/oral explanations. (activity 4)

Competences

By the end of the lesson, students will demonstrate:

- Systems thinking competence: Relating soil functions to wider ecosystem services, land use, and community wellbeing. (activity 1, 2 and 3)

- Critical thinking competence: Identifying land-use conflicts of interest and evaluating their impacts on soil and society. (activity 2)

- Problem-solving competence: Designing soil-friendly solutions that balance environmental and social/economic demands. (activity 3)

- Collaboration competence: Working effectively in groups to discuss, map, and negotiate trade-offs. (activity 2 and 4)

- Civic/environmental competence: Understanding the importance of soil stewardship in shaping sustainable towns and local environments. (activity 3 and 4)

LEARNING OBJECTIVES ALIGNED WITH SOIL COMPETENCE AREAS

1. Soil functions
Indicators: Students can explain that soil supports plant and animals, filters water and provides the foundation for infrastructure and building.
Descriptors: Using a local map and the FAO “Soil Functions” poster, students discuss how different land uses (e.g., forests, agriculture, sealed surfaces) relate to soil functions and ecosystem services.

2. Soil diversity
Indicators: Students can recognise that soils vary within their local area and that natural features and human activity shape these differences.
Descriptors: Using local maps, students compare sections to identify how soil diversity influences land use and how it can be supported or degraded.

3. Soil threats
Indicators: Students can identify at least one current or potential soil threat (e.g., sealing, pollution, erosion, biodiversity loss) in their local region and explain the conflict of interest behind it.
Descriptors: Students analyse land use in their map sections, discuss trade-offs (e.g., agriculture vs. housing), and reflect on how land-use changes over time have affected soil functions.

4. Soil solutions
Indicators: Students can propose land-use changes that benefit soil functioning.
Descriptors: Through the redesign of their assigned map grid, students propose soil-friendly interventions (e.g., green spaces, reduced sealing, sustainable farming) that balance housing, infrastructure, and nature conservation.

LESSON STRUCTURE

Activity 1: Soil functions & map introduction
Duration: 10 minutes

Description
Teacher shows a map of the local area or hometown where the school is located.
Suggestion - opening questions, such as: *What do you think lies beneath our feet in this area? or How might the soil affect our daily lives here?*
Together, the class explores different land uses (e.g., residential, industrial, agricultural, and green spaces) and natural features (e.g., rivers, hills, forests). The discussion then connects these land uses to soil functions and ecosystem services, highlighting how some practices support or threaten them. For example, forests and meadows often support food, fibre, and water purification, while sealed surfaces can increase flood risk, and industry may contribute to soil pollution. To visualize soil services, the FAO poster *"Soil Functions"* (see Materials) is used as a supporting tool.

For greater impact, this activity can be linked to a short field walk around the school, where students observe land uses and connect them back to the map.

Materials
- Map displayed in the front or printed for each student individually (or if that is not possible, you can also use satellite images or screenshots from Google Earth)
- FAO poster "Soil functions" printed for each student individually
Link:
https://openknowledge.fao.org/server/api/core/bitstreams/5934eac5-9dfd-4c09-85be-693e4b59a7cc/content

Setup instructions
Place map in the front or distribute printed maps.

Step-by-step process

1. Teacher shows a map of the local area (printed, projected, or using digital tools like Google Earth, simplified QGIS, or MapBox).
2. Class discussion:
    a. What land uses do you see (residential, industrial, agriculture, green spaces)?
    b. Which natural features (rivers, hills, forests) influence these land uses?
3. The teacher explains that the map will be the basis for the next activities.

Activity 2: Land use analysis
Duration: 10 minutes

Description
Students work in small groups on individual parts of the local area map. For example, a grid can be placed over the map to define individual sections. Students analyse the relation between land use and soil functions. They indicate areas on the map (e.g. by drawing) that help or diminish soil services, respectively, using the FAO poster "Soil functions" as an aid.
Suggestion - a simple colour code can be used (green = positive contribution; red = threat; yellow = neutral/ambiguous).

Further, they briefly discuss one of these guiding questions in the small groups (each guiding question could also be assigned to each group). Based on your observations about the connection between land use and soil functioning:

- If the soil in your area became degraded (e.g., sealed, polluted), what impacts would you expect on the community?
- Which soil functions (food production, water storage, habitat, infrastructure support, …) seem most important for your map section, and why?
- What trade-offs do you see between different uses of the same soil (e.g., farming vs. construction, recreation vs. conservation)?
- Who benefits and who might be harmed by these land uses?

Materials
- Printed sections of map of local area
- Paper and coloured pencils

Setup instructions
Prepare sections of the chosen local area map for distribution to small groups.

Step-by-step process
4. The teacher distributes tasks/questions and maps to the groups.
5. Students follow instructions to identify/draw/answer and record their findings either on a large map for the whole class or one per group.

Recording
Students record findings on a map.

Activity 3: Our town in the past and the future: Redesign your map grid
Duration: 20 minutes (can be much longer)

Description
The teacher presents maps of the same area from different points in time to show how land use has changed. These are compared with a soil map to highlight the diversity of soils in the region and how this shapes land use options. The class then discusses and summarizes the observed changes, exploring how shifts in land use have affected soil functions, soil diversity, and potential or past conflicts of interest, as well as possible solutions.

After the discussion, students redesign their assigned map grid - individually or in small groups - by considering soil diversity and soil functions, proposing changes that make the local environment more soil-friendly while still accommodating housing, infrastructure, and industry. If the students do not come up with any ideas, the teacher can start by giving a short, basic list of possible options (planting trees, community gardens, permeable pavements, etc.).
Suggestion - Reflect on how your redesign would benefit people and nature and what challenges it might face in real life.

Materials
- Maps from the same area e.g. from 10 and 50 years ago (projected)
- Soil map of the same area
- Paper and pencils

Setup instructions
Each student or small group of students draws their map grid and adapts parts to make them more soil friendly.

Step-by-step process
1. Present maps of different points in time and compare to the current land uses. Connect land use changes to soil functionality and how individual soil functions can be improved by land use changes.
2. Work individually or in small groups to redesign your map grid:
    a. Propose at least two interventions that could improve or protect soil functions while balancing other land-use needs (housing, infrastructure, industry).
    b. Consider multiple options and discuss the trade-offs.
    c. Draw or digitally create your redesigned map using clear symbols, colors, and a legend.
    d. Explicitly indicate:
        i. Land use types
        ii. Soil functions maintained or enhanced
        iii. Areas where threats are reduced or mitigated
    e. Explain your design choices, linking them to soil functions, land-use needs, and potential conflicts of interest.
    f. Highlight innovative or practical solutions and how they could be implemented in the real world.

Recording
Individual students or teams (if preferred) draw their own maps.

<u>Activity 4: Sharing & Wrap-Up</u>
Duration: 5 minutes

Description
Both the original printed map grids and the redesigned versions are collected and displayed on a wall. Each group then shares a brief statement highlighting one change they made to enhance soil functioning in their assigned map section.
Suggestion - at the end, the teacher can lead a group discussion with questions such as: *What surprised you about how land use affects soils? Or What small changes could we make in our real community?*

Materials
- Map sections from each group (original and redesigned)
- Pins, tape, or magnets for displaying maps

Set-up instructions
- Clear a wall or bulletin board where all map sections can be arranged together.
- Prepare labels or markers for group names to identify each map section.

Step-by-step process
1. Students place their map sections on the wall, reconstructing the full map as a single display.
2. Each group briefly presents one key change from their redesigned map that improves soil functioning.

Recording

- Take a photo of the full reconstructed map as a record. Or put the photos and notes on a digital board (Padlet, Canva, Miro) for continuity.
- Optionally, have each group write a short note (1–2 sentences) summarizing their highlighted change, which can be attached next to their map section.
- Collect these notes for reference or for assessing understanding and creativity.

Assessment

Formative assessment
- Ongoing observation and feedback during class activities to monitor student understanding and engagement:
- Observation during discussions and group activities: Note who contributes thoughtfully to the analysis of land use and soil functions.
- Participation in mapping exercises: Track engagement in identifying land uses, soil functions, threats, and proposed interventions
- Integration of soil literacy: Observe whether students explicitly consider soil functions, threats, and sustainable solutions in their map analysis and redesign.
- Collaboration and engagement: Monitor group interactions, teamwork, and the ability to discuss trade-offs or conflicts of interest.

Indicators (measurable examples):
- Actively participates in group discussion at least twice per activity.
- Correctly identifies at least two soil functions per map section.
- Suggests at least one intervention to improve soil function in redesign activity.
- Contributes to collaborative decision-making or conflict resolution in small groups

Summative assessment
Evaluation of students' final outputs to assess understanding, reasoning, and application:

Task: Submit the redesigned map grid along with a short-written explanation (1–2 paragraphs) addressing:

1. Why certain land uses were chosen.
2. How soil functions influenced their design.
3. How the plan balances human needs (housing, infrastructure, industry) and soil-friendly parts (forest, parks, arable land that is managed in a sustainable way).

Optional extension: Interview a family member or friend about local land-use conflicts and reflect briefly on observed differences in perspectives.

Indicators (measurable examples):

- Map clarity: Legend, symbols, and land-use types are clearly represented.
- Integration of soil literacy: Soil functions, threats, and sustainable solutions are explicitly identified.
- Quality of written/oral explanation: Reasoning is consistent, connections to real-life local issues are clear, and ideas show originality.
- Transversal skills: Collaboration, critical thinking (identifying conflicts or trade-offs), and clarity of communication demonstrated.

Criterion	Excellent	Good	Sufficient	Insufficient

Map Clarity	Legend and symbols fully accurate; land-use types clear	Minor issues with legend or symbols; mostly clear	Some land-use types or symbols unclear	Legend missing or inconsistent; map confusing
Soil Literacy	Soil functions, threats, and solutions fully identified and addressed	Mostly addressed; minor omissions	Superficial or incomplete identification	Largely missing; solutions absent
Written/Oral Explanation	Logical, detailed, original; strongly linked to real-life context	Mostly logical and relevant; some connections missing	Basic reasoning; limited connections	Unclear or missing; reasoning weak
Transversal Skills	Excellent collaboration, critical thinking, and communication	Good collaboration and critical thinking; minor communication issues	Some collaboration or critical thinking; communication partly unclear	Poor collaboration; minimal critical thinking; unclear communication

Differentiation strategies

<u>For advanced learners</u>
- Evaluate inclusion of trade-offs between soil functions (e.g., biodiversity vs. agriculture) or climate adaptation measures in redesign.
- Encourage students to add climate adaptation measures to their redesigned map (flood protection, urban cooling, etc.)
- Assign students to act as 'planners' for different stakeholders (farmer, developer, environmentalist) and argue decisions during the wrap-up.

<u>For struggling learners</u>
- Focus on identification of key land-use zones and soil functions; partial completion of redesign with support from peers or worksheets.
- Provide a local map with main land-use zones or soil areas already outlined, so they can focus on interpreting rather than drawing from scratch.
- Pair struggling learners with a stronger peer or create mixed-ability groups.

<u>For students whose first language is not the language of instruction</u>
- Provide a mini-icon sheet (house = housing, tractor = farming, tree = forest, wave = water) to help label maps without relying only on text.
- Assessment can consider accurate use of icons and visual representations alongside written explanations.
- Supply key vocabulary with translations (e.g., *soil, drainage, agriculture, conflict, sustainable*).
- Allow them to explain their map in pairs before sharing with the class or allow oral presentations in pairs.

Extension activities

<u>Immediate extensions</u>

- Stakeholder simulation: Assign students stakeholder roles (farmer, developer, mayor, conservationist, resident). Each group must argue how their map redesign benefits their stakeholder, and compromises are discussed.
- Soil threat mapping: Add extra map symbols for soil threats (erosion, compaction, pollution, sealing) and place them on current or redesigned maps.
- Town slogan / campaign: Students create a slogan, poster, or “news headline” to present their soil-friendly town vision.
- Comparative analysis: Compare redesigns between groups, highlighting overlaps, differences, and possible conflicts between visions.

Home learning
- Neighbourhood walk: Students take 2–3 photos (or make sketches) of local land uses and link them to soil functions (e.g., playground = recreation + water infiltration).
- Family interview: Ask an adult, *“How has land use in our town changed since you were young?”* and write a short reflection.
- News connection: Find a recent news article on land use or soil issues (e.g., flooding, housing expansion, farming). Summarize the problem and suggest one soil-friendly solution.
- Creative writing: Write a short diary entry or story set in their “future town,” showing how soil stewardship shapes daily life.

Health and safety considerations

- Field walks (if included): ensure supervision, safe routes, appropriate footwear, and avoidance of restricted/private areas.
- Classroom materials: use only safe drawing and cutting tools (scissors, pins, markers).
- Accessibility: adapt fieldwork tasks for students with mobility challenges (e.g., virtual tours, Google Earth, or teacher-provided photos).
- Group work: establish clear behaviour guidelines for collaboration to avoid conflict or exclusion.

Syllabus content reference
This lesson addresses:
- Local land use: identifying and interpreting maps of the local environment.
- Soil literacy: analysing soil functions, threats, and ecosystem services.
- Human-environment interaction: connecting land-use changes to soil sustainability and conflicts of interest.
- Mapping skills: drawing, interpreting, and redesigning maps with legends and symbols.
- Citizenship/environmental education: evaluating trade-offs and proposing sustainable solutions for future land use.

Teacher's preparation notes
- Maps: Collect current and historical maps of the local area (municipal planning office, library, Google Earth, local history archives). Prepare printed grids for group work.
- Soil functions poster: Print enough copies of FAO’s *“Soil Functions”* poster (or one large poster for class display).
- Materials: Prepare coloured pencils, blank paper, pins/tape/magnets for displaying maps, and optional icon sheets (housing, farming, green space, water).
- Differentiation aids: Pre-outline land-use zones on some maps for struggling learners; prepare vocabulary lists and icons for EAL students.
- Technology check: Test projector, Google Earth, or other mapping software if using digital tools.

- Optional extensions: Prepare stakeholder role cards and soil threat icons in advance if you plan to include them.