



The Crown Estate Sustainability Initiative

Meadow Quest lesson

Teacher guide

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OVERVIEW

Thank you for downloading these resources to use with your students. By equipping your students with the knowledge and skills to understand biodiversity, nature recovery, and sustainability, you are empowering them with the tools to take positive action in their own communities, now and in their futures.

This lesson links to the Meadow Quest assignment in the Conservation Quest at Windsor Great Park.

Students will:

- Review preconceptions of soils
- Investigate soil composition and meadow management
- Apply understanding to analyse soils in the meadow

Throughout the lesson, you will find background information on each topic. **There is also a glossary of key terms at the end.**

To find out more about how to use these resources, watch our teacher video on the website.



OUTCOMES

Students will understand the importance of soil and how to promote biodiversity through meadow management.



SKILLS

Teamwork, communication, critical thinking



VOCATIONS

Farming, Soil Science, Ecology, Microbiology



RESOURCES

- Presentation slides
- Soil information worksheet
- One set of Soil information cards per team
- One set of Meadow management statements per pair
- Pens or pencils



TIMINGS

We have included activities for your class that develop themes from the Minecraft worlds. They are sequenced to build on each other, but we encourage you to pick and choose the ones that will work best for your class and the time available. We have included approximate timings as a guide, but you may wish to spend longer on certain sections.

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Introduction and gameplay	32 minutes	2
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Stats quoted in these lesson packs refer to the UK.




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Introduction

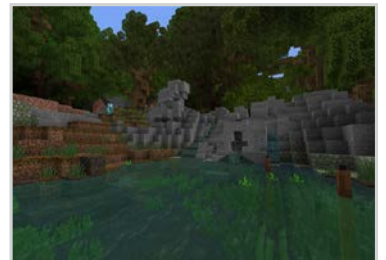
 (2 minutes)

- Introduce students to the Conservation Quest at Windsor Great Park that they are about to explore. Explain that this world will highlight biodiversity, sustainability and ecology and how our decisions can impact this in the long term.
- In the Meadow Quest, players will learn about the environmental management of meadows to increase biodiversity. Their assignment is to help rotate the grazing of the meadow fields by moving cattle and rewilding the fields with wildflower seedbombs.

Minecraft gameplay

 (30 minutes)

- When they launch the world, students will enter the lobby and meet Dotty the Dragonfly, their helpful guide. To take part in each challenge, students can visit the Windsor School from the estate office. In the school, there are four classrooms - and from each one, students can teleport instantly to a different challenge.
- For the purpose of this lesson, you may wish to direct students to teleport directly to the Meadow Quest but they can come back and explore the world in their own time too.
- Consider sharing the reflection questions below with your students before they explore the world, so that they can keep them in mind throughout and ahead of class discussion.



Reflecting on gameplay (Slide 2)

 (5 minutes)

- Facilitate a class discussion about the activity, encouraging students to reflect on new knowledge gained, anything they found challenging/easy/interesting.
- To steer discussion, you could ask them:
 - Where is the activity based?
 - What has happened so far?
 - What did you find out about farm management?
 - Can you remember what an insect specialist is called?






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Starter activity – Soil composition (Slide 3-5)

 (10 minutes)

This starter activity will help students understand what soil is made of, why this matters, and how it is important for life.


- Explain why soil is important (**slide 3**): it provides the basis for almost all plant growth on land, it is important for growing food for all 8 billion people on Earth and soil health is declining - so we need people to study soil and look after it.
- Put students into teams of 4 and hand out one set of **Soil information cards** and one **Soil information worksheet** to each team (**slide 4**).
- Tell the teams to read the information from the cards out loud at their table (with students taking it in turns, so each student reads out one of the cards).
- Ask students to spend a few moments discussing what they have heard and anything they don't understand, then to work together to fill in their worksheet (**slide 5**). Each student should answer the section relevant to their card.
- Using the Soil information cards, read out the correct answers to ensure no groups are left with misconceptions.

 THE CROWN ESTATE

Why is soil important?



- Soil provides the basis for almost all plant growth on land.
- It is vital for growing food for the 8 billion people on Earth.
- It is composed of many different organic and inorganic substances.
- It is a complex mixture, and the composition of soils varies widely depending on location.
- Soil health is declining so we need people to study soil and look after it.

 THE CROWN ESTATE

Why is soil important?

- Each team has been given 4 cards with information about the importance of soil.
- Each of you must read out the information on a card to the team. This is your card.
- Discuss anything that you don't understand.
- If your team doesn't understand something, write it down.

BACKGROUND INFORMATION

Soils and soil health

Children should learn about soils and soil health because healthy soils are critical for producing food, supporting biodiversity, and mitigating climate change.

Soils are alive: Soils are teeming with life, including bacteria, fungi, insects, and worms. These organisms help to break down organic matter and recycle nutrients back into the soil, which is essential for healthy plant growth.

Soils are diverse: Soils vary in their physical, chemical, and biological characteristics depending on factors such as climate, geology, and vegetation. Different soils support different types of plants and animals, and provide a range of ecosystem services, such as water filtration, nutrient cycling, and carbon sequestration.

Soils are vulnerable: Soils can be degraded by human activities such as deforestation, intensive agriculture, and urbanization. Soil degradation can lead to decreased fertility, erosion, and loss of biodiversity, which can have negative impacts on food security, climate change, and human health.

Soil health is important: Soil health refers to the ability of soils to function effectively in supporting plant growth, maintaining ecosystem services, and resisting degradation. Healthy soils have high levels of organic matter, diverse microbial communities, and good soil structure. Children should learn about the importance of maintaining soil health through practices such as sustainable agriculture, composting, and soil conservation.

Soils are valuable: Soils provide a range of ecosystem services that are essential for human well-being, including food production, clean water, and climate regulation. Children should learn about the value of soils and the importance of protecting them for future generations.



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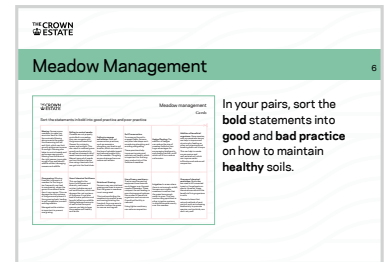
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Activity - Healthy Meadows (Slide 6-7)

(10 minutes)

In this activity, students will work in pairs to learn about the activities that can keep meadows healthy – and the practices that can degrade soil quality.

- Show **slide 6** and hand out one sheet of cut out statements from the **Meadow management worksheet** to each pair.
- Tell students to sort the jumbled up statements into two groups – **good practice** (instructions on how to maintain a healthy meadow) and **bad practice** (possible threats to the meadow). There are 6 of each type of statement.
- Encourage them to discuss the different statements and what the consequences of each might be.
- Show students the answers (**slide 7**).

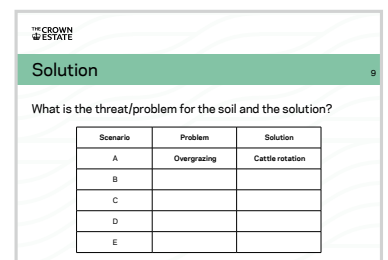
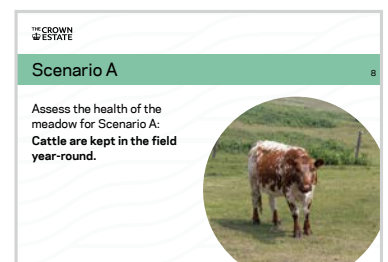


Activity - Meadow Scenarios (Slide 8-17)

(10 minutes)

In this activity, students will need to apply the information from the previous two activities to a variety of meadow scenarios.

- Put students back into their teams of 4. Give each team one **meadow scenario worksheet**.
- Tell students they are now going to apply their understanding by helping Farmer Francis improve the soil health of different meadows.
- Explain that you will show them information and pictures for 5 different scenarios on a farm (**slide 8-17**).
- Go through the example scenario A (**slide 8**) as a class and show the answers (**slide 9**) which are pre-filled on their worksheet (the soil is not healthy; caused by overgrazing; cattle rotation could help).
- For each scenario, teams need to decide whether the meadow soil is healthy - and if not then they need to suggest ways to improve the soil health using the worksheet.
- Give teams a minute to discuss each scenario, reach a decision and write it down.
 - Encourage teams to refer back to the soil information cards and meadow management statements for information.
- For each scenario, pick one team to share their ideas - and explain the correct answer if they miss anything.






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Activity - Meadow scenarios (Slide 8-17) Cont'd

 (10 minutes)

Starters/prompts:

Meadow B (slide 10):

- What is your soil health diagnosis? (expected answer – it looks like heavy machinery has compacted the soil)
- How could you improve the meadow? (expected answer – use smaller farm machinery that won't compact the soil)

Meadow C (slide 12)

- Do the meadow and soil look healthy? (expected answer – yes, you can see different species and the soil is rich in organic matter)

Meadow D (slide 14)


- Do the meadow and soil look healthy? (expected answer – no, there doesn't seem to be any organic matter or worms)
- What is your soil health diagnosis? (expected answer – it looks like heavy clay soil that needs attention)
- How could you improve the meadow? (expected answer – add organic matter and encourage worms)

Meadow E (slide 16)

- Do the meadow and soil look healthy? (expected answer – no, there is considerable soil erosion)
- What is your soil health diagnosis? (expected answer – we need to stop the erosion)
- How could you improve the meadow? (expected answer – improve drainage, plough the opposite direction to runoff and plant hedges)


Scenario C 12

Assess the health of the meadow for Scenario C:
Cows are allowed in the field on rotation and the field is left fallow (empty) regularly.




Scenario D 14

Assess the health of the meadow for Scenario D:
The field contains heavy clay soil that gets waterlogged.



Scenario E 16

Assess the health of the meadow for Scenario E:
Ploughed meadow that has soil erosion.



Reflection (Slide 18)

 (5 minutes)

Before finishing the lesson, encourage your students to reflect on their learning. In particular, we want them to reflect on the skills involved in protecting biodiversity and meadows, as well the careers they met in the game. Use **slide 18** as a prompt.

- What was the most interesting thing you learned today? Did anything you learned surprise you?
- What skills did you use in the last activity?
- What skills are most useful for meadow management?
- As well as farmers, which other jobs do you think are the most important for protecting soils and meadows?

Reflection 18

- What was the most interesting thing you learned today? Did anything you learned surprise you?
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Real world action

Building student agency with real world action

By taking part in this lesson, students have developed their:

- knowledge of a key sustainability topic
- understanding of why it is important
- practical toolkit, and articulation, of their own green skills

These are the ingredients that enhance students' agency and power to take real world action that builds biodiversity and supports nature recovery.

There are a number of ways you can support them to take their learning forward and continue this process beyond the classroom. Getting children interested in soil can be a fun and engaging way to teach them about the natural world and the importance of healthy ecosystems. You could consider:

- **Hands-on exploration:** Providing opportunities for students to explore soil in a hands-on way can be a great way to pique their interest. This could include:
 - digging in the soil,
 - searching for worms and other soil organisms,
 - conducting simple experiments to test soil properties like texture and moisture.
 - 'Plant your pants' is a fabulous way to get children engaged with soil quality (<https://www.countrytrust.org.uk/news/plant-your-pants>).
- **Gardening:** Gardening is a great way to get children involved in soil and help them learn about plant growth and soil health. Whether it's planting a small vegetable garden or tending to a collection of potted plants, gardening can be a fun and rewarding way to teach children about soil and the natural world.
- **Field trips:** Field trips to local farms, parks, or nature centres can be a great way to show children the different types of soil and ecosystems that exist in their local area. They can also learn from professionals and ask questions about soil science and management.

Lesson 5 in this series - Taking action toolkit

For more ideas on safe and manageable ways to harness the enthusiasm your students may have for this or other biodiversity topics, we have created a **Taking Action Toolkit**.

It features accessible principles to empower students to identify key issues that they care about, affecting their school/local community, and begin creating meaningful solutions for nature recovery with their peers.





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Glossary

- **Carbon storage:** The process of capturing and storing carbon from the atmosphere in different forms, including in soils, trees, and other vegetation.
- **Crop rotation:** The practice of growing different crops in the same field over a sequence of seasons or years. This can help to improve soil health, reduce pest and disease pressure, and increase yields. Sometimes temporary meadows are created by the farmer as part of the rotation.
- **Green manure:** The practice of growing crops specifically for the purpose of ploughing them into the soil as a source of organic matter and nutrients. This can help to improve soil fertility and structure.
- **Farmyard manure:** When cattle are kept indoors, their manure is collected into heaps and allowed to rot down. Then it can be spread lightly across meadows as organic fertiliser (in contrast to chemical/inorganic fertilisers which can have negative impacts on the environment).
- **Meadow:** A piece of land that is covered in grasses and other non-woody plants, and is typically used for making hay, and grazing livestock or as a habitat for wildlife. The most important surviving meadow habitats have survived over many decades without being ploughed or damaged by fertilisers and herbicides.
- **Mineral:** A naturally occurring substance that is typically solid and inorganic. Minerals can be found in rocks, soils, and other geological formations.
- **Overgrazing:** The practice of allowing livestock to graze on a piece of land to the point where the vegetation is depleted and the soil is exposed. This can lead to soil erosion, reduced plant productivity, and other environmental problems.
- **Organic matter:** The decomposed remains of plants and animals, including leaves, twigs, and animal manure. Organic matter is an important source of nutrients and can help to improve soil structure and water-holding capacity.
- **Soil:** A mixture of minerals, organic matter, air, and water that forms the upper layer of the Earth's surface and supports plant growth.

