Tea-Composition

Suggested Lesson Plans
Stage 3 Science and Mathematics

Image: https://www.survivalkit.com/blog/unexpected-uses-for-tea-bags/

Unit title	**TEA-COMPOSITION**	**Duration**	3 lesson sequences equivalent to 5 lessons – total time approximately 10 hours
Unit description	In this unit, students will be investigating the components of soil and have an opportunity to appreciate why soils and soil health is so important. The unit will encourage students to become more aware of the role of soils and soil maintenance in the major Cross Curriculum Priority of Sustainability and will provide students with the opportunity to become involved in the international Tea Bag Index project, supported by the University of Sydney. Students will also carry out some investigations and activities related to maintaining and even improving soil health, whilst gaining valuable experience in the skills associated with Working Scientifically/Working Technologically and Working Mathematically. It is an exciting project, enabling students to directly develop their skills in experimentation, field testing and the analysis and communication of results.		

Outcomes

Science & Technology:

- ST3-2VA: A student demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures.
- ST3-3VA: A student develops informed attitudes about the current and future use and influence of science and technology based on reason.
- SC3-4WS: A student investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations.
- SC3-5WT: A student plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints.
- SC3-9ES: A student explains rapid change at the Earth's surface caused by natural events, using evidence provided by advances in technology and scientific understanding.
- SC3-11LW: A student describes some physical conditions of the environment and how these affect the growth and survival of living things.

Mathematics:

- MA3-1WM: A student describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions.
- MA3-7NA: A student compares, orders and calculates with fractions, decimals and percentages.
- MA3-11MG: A student selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity.
- MA3-12MG: A student selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass.
- MA3-18SP: A student uses appropriate methods to collect data and constructs, interprets and evaluates data displays including dot plots, line graphs and two-way tables.

Lesson 1

Class: Stage 3 mixed ability – Years 5 or 6	**Available time:** 2 hours – equivalent to 2 x one-hour class lessons
Key Learning Area: Integrated Science/Mathematics	**Lesson sequence 1:** Introduction to soil science – 'What's in soil?'
Syllabus outcome(s): **SCIENCE & TECHNOLOGY:** • ST3-2VA: A student demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures. • ST3-3VA: A student develops informed attitudes about the current and future use and influence of science and technology based on reason. • SC3-4WS: A student investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations. **<u>MATHEMATICS:</u>** • MA3-1WM: A student describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions. • MA3-7NA: A student compares, orders and calculates with fractions, decimals and percentages. • MA3-12MG: A student selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass. • MA3-18SP: A student uses appropriate methods to collect data and constructs,	**Indicators of learning for this lesson:** *<u>By the end of this lesson, the students will be able to:</u>* • Describe some of the major components found within soil samples taken from the playground/oval/local bushland or other suitable area close to the school environment. • Plan and perform an investigation to measure the water content in their samples of soil. • Describe how a variety of soil samples feel when rubbed between their fingers. • Perform an investigation, using hydrogen peroxide solution, to measure the level of organic matter within some samples of soil. • Follow an investigation method to measure the pH of various samples of soil. • Use appropriate measuring tools, such as measuring cylinders and/or cups, balances and/or kitchen scales, to measure volume and mass changes. • Collaboratively develop tables to show a variety of obtained data. • Present obtained data using a variety of appropriate graph types. • Present ideas describing the importance of soils to all life on Earth.

interprets and evaluates data displays including dot plots, line graphs and two-way tables.	
Any safety issues to be considered: • It is important that students do not inhale or taste the soil and they should be instructed to wash their hands after all activities involving touching the soil or chemicals used in the investigations. Safety glasses should be worn when using chemicals – especially hydrogen peroxide, and disposable gloves should also be considered for younger students. • If using heat lamps in the soil moisture activity, students should be warned of potential burns and should not touch or look at the lamps after the teacher has set them up.	**Resources:** • Samples of soil from at least 2 or 3 locations within or around the school environs; this could include gardens, oval soil, bushland soil • Magnifying glasses • Oven/BBQ foil food trays • Glass dishes or plastic trays (lids from take away food containers are suitable) • 100mL measuring cylinders or measuring cups • Kitchen scales or balances • Rulers • Clean white tile or sheet of overhead transparency acetate • Universal indicator in dropper bottles or pool pH testing liquid (Raupach indicator) or provided soil pH kit • pH colour chart to suit indicator used • Barium sulfate powder [$BaSO_4$] – obtainable from chemists or garden supply stores, such as Bunnings and Flower Power. Alternatively, soil pH kits may be bought from the hardware and nurseries, as previously named • Hydrogen peroxide in dropper bottles – stock bottles are obtainable from chemists and supermarkets • Safety glasses • Paddlepop sticks

LESSON SEQUENCE

Lesson content	Teaching strategies / learning experiences:	Resources and organisation:
1. What is soil and why is it important?	1. Introductory video clip on soil – stop as needed to initiate class discussion. 2. Class discussion: • Ask students if soil is an important ingredient in their everyday life. • Remind students that last night they slept in a building built on soil. They breathe air from plants that come from the soil. They wear clothes made from plants that grow in the soil. We play on soil, we drive on soil and, in fact, the entire Earth is dependent on soil. 3. Word wall: Start a class word wall about soil, to be added to as students experience more about soils.	1. You Tube clip: https://www.youtube.com/watch?v=I6HGPoQ3dZY 2. Use images or photographs of various types of buildings, plants, animals and soil – to suggest to students that soil is fundamental to all life on Earth. 3. Cards, pens and paper ready for word wall.
2. What's found in soil? [Tabulation of data obtained should commence here]	1. Using magnifying glasses, students examine samples of soil taken from within and around the school playground. Try to choose samples that contain organic material and if possible, earthworms or other invertebrates. 2. Students should make a table, with teacher guidance, that lists the features of their soils – use colour, variety of particle size, presence or absence of animals and/or plants or leaf litter. The table	1. https://www.sciencelearn.org.nz/resources/890-what-is-in-soil (NZ site) 2. Students should be warned to not harm/kill or squash any animal they find; check for spiders before giving samples to students. 3. Samples are best taken from a variety of locations, so students can see clay, sand and loam soils if possible. Try to locate sample areas similar to where tea bags will be buried for Tea Bag Index investigation.

	should have sufficient space so that students can add further information obtained about the following subsequent tests – moisture content, soil texture, organic matter and pH of soils. 3. Students are encouraged to draw what they see under the magnifying glass, or take photos with their device if used in class.	
3. Measuring moisture content in soils	1. Weigh a metal/foil food dish and the record weight (g). 2. Take a heaped tablespoon of soil, spread it out in the foil dish and record the weight (dish + soil). 3. Leave the soil out to dry in a sunny spot, under a heat lamp, on a hot plate or in a slow drying oven. The soil should be dry. 4. Reweigh the dry soil sample and calculate the percentage of water in the soil sample.	1. Soil will need to be left for at least 30 minutes under the heat lamp, so it is suggested this activity is set up first. Some samples with high organic matter will smell, so best placed near an open window if possible. 2. Students may need considerable support with the calculation of weight loss and percentage of water in the soil. Suggest the following method: - Weigh empty foil/oven/BBQ food tray - Weigh soil sample in metal food dish before heating - Subtract weight of empty dish, to show weight of soil actually heated - Weigh soil sample in metal food dish after heating - Subtract weight of empty dish to show weight of soil after heating - Subtract final weight of soil from initial weight of soil = water loss - % water in soil sample = water loss ÷ initial mass of soil x 100 3. If students within the class have compared a number of soil samples, results can be shared using a table on the whiteboard/Smartboard or next to the word wall.

4. Examining the texture of soils	*Settling:* 1. Students should place a tablespoon of soil into a measuring cylinder or screw top jar and fill with water. 2. Cover the top of the measuring cylinder with foil and with your hands, shake the contents for a minute OR put the lid on the jar and shake. 3. Allow the contents to settle. Record your results noting the order in which the soil settles. This can be done either as a photo with inserted labels OR with a simple labelled diagram. Is the water clear or is there a suspension of material? Hint: Clay particles are generally so tiny that they suspend in water but settle after several days. *Making a bolus and ribbon* 1. Students should take a handful of soil, remove leaves, etc and wet the soil with water a little at a time and knead it to an even consistency. Students can be advised to handle the soil like playdough. The sample should be moist and held together and not sticking to your hand. This is called a bolus (mud pie). Work the bolus for about 5 minutes in your hand, listening to what happens. 2. Squeeze (push) the bolus through your thumb and first finger to make a ribbon and notice what happens.	1. Use a screw top jar for this activity and make sure the lid is on tightly before students shake or invert it. 2. Soil texture refers to how coarse or fine a soil is, that is, how much sand, silt and clay it contains. Texture has a major influence on how much water a soil can hold. Generally, the smaller the soil particles (the more silt and clay), the more water a soil can hold (but this water may not all be available to plants). This is important knowledge for vegetable growers. 3. Making a bolus:  If the soil won't form a ball or a ribbon and the grains stick to your hand/fingers, it is <u>sandy,</u> and NOT ideal for growing vegetables, but suitable for some native plants. If the soil makes a spongy ball (you can't feel any sand) and the ribbon breaks at 2.5cm, it is <u>loamy</u>. This soil could be good for growing some types of vegetables. If the ball is compact and very smooth, holds a lot of water and feels like plasticine, it is <u>clayey</u>. This soil is not good for vegetables as the soil is too

		sticky and roots cannot absorb sufficient water. Discuss that some soils will have a mixture of textures – e.g. sandy loams, loamy clays, etc so students may feel different components of their soil, but for these purposes, we are looking for the dominant component.
5. Measuring organic matter in soils	1. Place a small sample of soil onto a white tile or sheet of OHP acetate. 2. Add several drops of hydrogen peroxide and observe any bubbles. The presence of bubbles indicates organic matter. Students may need to stir the sample with a paddlepop stick to promote the reaction.	1. Organic matter is the fraction of the soil made up of anything that once lived, including plant and animal remains, cells and tissue, plant roots and soil microbes. It is a dynamic, changing resource that reflects the balance between addition of new organic matter and loss of organic matter already in the soil. 2. Peroxide can be bought from the local chemist or supermarket. It will sting if students get it in their eyes or on small cuts and scratches. Safety glasses should be worn for this activity. 3. Organic material contains an enzyme that breaks down hydrogen peroxide to water and oxygen (bubbles). 4. If the soil does not contain any organic matter then the hydrogen peroxide does not break down quickly. 

6. Determining the pH of a soil sample	1. On the white tile, place a small amount of dry soil (about the size of a 50c coin). Add several drops of the indicator until the soil is moist throughout. 2. Gently sprinkle some barium sulfate [$BaSO_4$] powder onto the soil. $BaSO_4$ will absorb some of the indicator and show its colour. 3. Refer to the pH colour chart provided and work out the pH of this soil sample.	1. Testing the **pH** of a soil provides information about its acidity, neutrality and alkalinity. pH is a number between 1 and 14 where *acidic soils have a pH less than 7, neutral soils have a pH of 7 and soils with a pH greater than 7 are alkaline*. Soil pH varies with rock type, rainfall and climate patterns. 2. Most plants such as vegetables and fruits grow best at a pH between 5.5 and 7.5. Soils which are either too acidic or too alkaline do not allow for plant nutrients to be absorbed by the roots or for bacteria which assist in plant growth to exist.
7. Summary	1. Summarise what the students have found out about their soil samples and whether the chemical and textural properties indicate that they would be good for vegetable growth.	1. Use tables of data to create summary information for each sample/location. 2. Add new words to the word wall.

Lesson 2

<table>
<tr><td>Class:
Stage 3 mixed ability – Years 5 or 6</td><td>Available time:
2 hours – equivalent to 2 x one-hour class lessons</td></tr>
<tr><td>Key Learning Area:
Integrated Science/Mathematics</td><td>Lesson sequence 2:
Why are soils so important?</td></tr>
<tr><td>Syllabus Outcome(s):

SCIENCE & TECHNOLOGY:
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<u>MATHEMATICS:</u>
• MA3-1WM: A student describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions.
• MA3-7NA: A student compares, orders and calculates with fractions, decimals and percentages.
• MA3-11MG: A student selects and uses the appropriate unit to estimate, measure and</td><td>Indicators of Learning for this lesson:

<u>By the end of this lesson, the students will be able to:</u>
• Describe why soils are important components of the local and global ecosystem.
• Plan and perform an investigation to show how much water three different types of soils can hold.
• Plan and perform an investigation to determine the best type of soil in which to grow a variety of vegetable seeds, such as radish, lettuce, cucumber, tomato and pumpkin.
• Plan and perform an investigation to determine what type of plants grow in specific types of soils, including sandy, loamy and clay-based soils.
• Use appropriate measuring tools, such as measuring cylinders and/or cups to measure volumes of water.
• Use appropriate measuring tools, such as rulers and tape measures, to record the height of various seedling plants.
• Use appropriate measuring tools, such as a balance or accurate kitchen scales to measure masses of tea bags before and after burial.
• Collaboratively develop tables to show a variety of obtained data.
• Present obtained data using a variety of appropriate graph types.
• Present ideas describing the role and importance of worms, bacteria and fungi in maintaining soil health.
• Perform an investigation about the rate and degree of decomposition in soils, as part of the Tea Bag Index project, and describe the process in a written format.</td></tr>
</table>

calculate volumes and capacities, and converts between units of capacity. • MA3-12MG: A student selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass. • MA3-18SP: A student uses appropriate methods to collect data and constructs, interprets and evaluates data displays including dot plots, line graphs and two-way tables.	
Any safety issues to be considered: • It is important that students do not inhale or taste the soil and they should be instructed to wash their hands after all activities involving touching the soil or chemicals used in the investigations. • If using cut PET bottles, students should not have access to knives or any other cutting implement.	**Resources:** • Camera/video equipment to record student experiences • Samples of at least three different types of soils – including sandy, loamy and clayey soils • Measuring cup/measuring cylinder • Plastic funnel, or cut PET bottle (top half) • Cotton wool • Several different types of vegetable seeds – such as radish, lettuce, cucumber, tomato and pumpkin • Small pots for growing seeds – could be ice cream or yoghurt containers • Tea bags to be used for Tea Bag Index project – supplied by the University of Sydney • Marker spikes to put into the ground to show location of tea bags • Different images of soil types and/or landscapes

LESSON SEQUENCE

<table>
<tr><th>Lesson content</th><th>Teaching strategies / learning experiences:</th><th>Resources and organisation:</th></tr>
<tr><td>1. Review work covered in previous lesson sequence on what is found in soils and why they are important.</td><td>1. Review word wall and note any additions.

2. Alternatively, use class Kahoot game to review previous material. Properties of soil investigated include texture, amount of water in a soil sample, pH and organic matter present.</td><td>1. Kahoot access: https://getkahoot.com/how-it-works</td></tr>
<tr><td>2. How much water can different types of soil hold?

[Tabulation of data obtained should commence here]

[Video recording of students' investigations should commence here]</td><td>1. Introduce the idea of different types of soils, based on student experiences with feeling different soil textures; the You Tube clip is useful revision.

2. Based on the clip, students will see that soils can be divided up into three main types – sandy, clayey and loamy and that these soils have different properties, including how they feel between your fingers and how much water they hold.

3. Discuss with students how they can measure the water holding capacity of soils, then set up the equipment for each type of soil.

4. Support students in setting up the data table and if desired, drawing a set of column graphs to show the differences between the soil types.

5. Possible further questions could consider: 'Soils in river</td><td>1. YouTube clip on types of soils: https://www.youtube.com/watch?v=uS7zfeK4OTQ

2. For each type of soil, set up the following:

https://staff.concord.org/~btinker/GL/web/geology/english/water_holding_capacity_files/image002.jpg
 
Note that measuring cylinders and plastic funnels can be used as a substitute, with cotton wool used as the plug for each soil sample placed inside the top half of the PET bottle.
Data tables could show this format:
<table><tr><td>Type of soil</td><td>Amount of water collected in measuring cup after 10 minutes (mL)</td><td>Amount of water remaining in soil (mL)</td></tr><tr><td>Sandy</td><td></td><td></td></tr><tr><td>Loamy</td><td></td><td></td></tr><tr><td>Clayey</td><td></td><td></td></tr></table></td></tr>
</table>

	valleys and flood plains are often very deep and fertile. What reasons can you give to explain this?' Or *'Give as many reasons as you can why plants grow better in certain soils than they do in others'*. This question leads onto the next activity about growing specific plants in certain types of soils.	
3. Investigating the different soil types needed by different plants	1. There are two different aspects to this activity: a) students will plant the same type of seed into each of the 3 different types of soil – sandy, clayey and loamy. b) students will plant a variety of seeds into each soil type. The activity has been split into two components so that students can review the aspects of a fair test and change only one variable at a time. 2. Ensure that students can develop appropriate testable questions about each of the components and tabulate their results about seed growth. 3. At the completion of the investigation, ask students to consider why certain types of soils support different plant growth. Relate this back to lesson sequence 1 and results from the investigation on water holding capacity of soils, to encourage students to appreciate that different plants require different soil conditions and plants may not grow if they put into the 'wrong' soil type.	1. a) Seeds can include radish, lettuce, cucumber, tomato and pumpkin – any fast-growing variety. It is important that students note the following: - What is changed – soil type - What is measured – growth of seedling - What is kept the same – amount of water added, conditions in which pots are placed (light, temperature), seed/plant type, number of seeds planted b) Use the same types of seeds as above, but place them into the three different types of soils. Again, review the fair test components: - What is changed – type of seed - What is measured – growth of seedling - What is kept the same - amount of water added, conditions in which pots are placed (light, temperature), soil type, number of seeds planted

4. What does soil need to make it 'healthy'?	1. Class discussion on what makes a healthy soil. Students should be able to link together their earlier experiences about what's found in soils and the types of soils that support plant growth. 2. Log onto the *Healthy Soils Australia* website and review what makes a healthy soil and what we need to do to maintain a healthy soil. Addition of words to the word wall is important. 2. Ask students if they have a compost pile at home and what goes into it, and why compost is placed on the garden. Some classes may appreciate the *Peppa Pig* You Tube clip. 3. Students could be encouraged to make their own class or school compost area/worm farm; stress the importance of adding composting worms and the presence of microorganisms, such as bacteria and fungi. Stress to students that not all bacteria and fungi are bad and in fact, we need them to survive. 4. Introduce to students the possibility of measuring how healthy a soil is by burying a material that decomposes and finding out how long it takes to break down, as a segue into the Tea Bag Index – to be	1. Healthy Soils Australia website: http://www.soilfoodweb.com.au/index.php?option=com_content&view=article&id=46&Itemid=54 2. *Peppa Pig* composting You Tube clip: https://www.youtube.com/watch?v=8PElbErayZg 3. Students may decide to make their own compost bin. This could be an opportunity to utilise the appropriate design and make activities. Also, see: https://www.gardeningknowhow.com/special/children/composting-ideas-for-kids.htm 4. Setting up a class worm farm – You Tube clip: https://www.youtube.com/watch?v=Berf8Sy0SCI 5. Students could be encouraged to set up a community garden within the school and use the 'worm juice' from their worm farm to support the growth of plants/vegetables in the community garden.

<table>
<tr><td></td><td>investigated during the next lesson sequence.</td><td></td></tr>
<tr><td>5.Using the Tea Bag Index as a guide to healthy soils</td><td>1. Class discussion on the principles behind the Tea Bag Index activity – namely that we can use the change in mass of the tea bags as an indication of the rate of the tea decomposition and thus, microbial and chemical activity within the soil area. It will also enable scientists to gauge how ‘healthy’ a particular soil area is.

2. Because this is a ‘longitudinal study’, students should be reminded to check on their tea bags to ensure that the splint markers are still visible and that the areas have not been disturbed.</td><td>1. Students, in discussion with the class teacher, should choose at least two different areas within the school grounds, or nearby park/bushland. Ideally, one site should have native vegetation and another should be a managed environment, such as the school oval. This will enable a comparison to be made about the rate of decomposition of organic matter in different soil types and with different environmental conditions.

2. Students should weigh a tea bag containing tea that has a fast decomposition rate, and another with a slower rate. Tea bags will be provided by the University. After the bags are weighed, they should be buried in close proximity to each other. Each site should be marked using a wooden splint or stake and labelled with the students’ names.

3. After around three months, the tea bags should be exhumed, dried and then reweighed. Use the table supplied in your kit, or a typical table of the results could be:

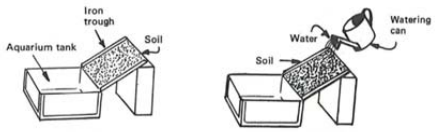
<table>
<tr><td>Site of burial of tea bag 1</td><td>Initial mass of tea bag 1(g)</td><td>Final mass of tea bag 1(g)</td><td>Change in mass of tea bag 1(g)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Site of burial of tea bag 2</td><td>Initial mass of tea bag 2(g)</td><td>Initial mass of tea bag 2(g)</td><td>Change in mass of tea bag 2(g)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
4. Students should combine their results, possibly in a set up Google doc, so that data from many trials may be considered.</td></tr>
</table>

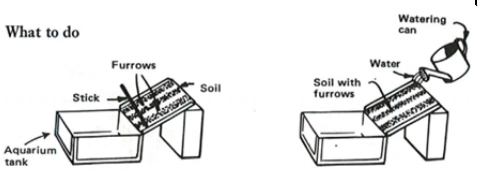
Lesson 3

Class: Stage 3 mixed ability – Years 5 or 6	**Available time:** 1 hour – equivalent to 1 x one-hour class lesson. Additional time may be needed in the follow up to the Tea Bag Index project
Key Learning Area: Integrated Science/Mathematics	**Lesson sequence 3:** How can we look after our soils?
Syllabus outcome(s): **SCIENCE & TECHNOLOGY:** • ST3-2VA: A student demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures. • ST3-3VA: A student develops informed attitudes about the current and future use and influence of science and technology based on reason. • SC3-4WS: A student investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations. • SC3-5WT: A student plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints. • SC3-9ES: A student explains rapid change at the Earth's surface caused by natural events, using evidence provided by advances in technology and scientific understanding. • SC3-11LW: A student describes some physical conditions of the environment and how these affect the growth and survival of living things.	**Indicators of learning for this lesson:** *By the end of this lesson, the students will be able to:* • Describe why soils are important components of the local and global ecosystem. • Perform an investigation to show what factors affect the way in which soil can be moved from one place to another via erosion. • Perform an investigation to show some ways in which soil erosion can be controlled. • Use appropriate measuring tools, such as measuring cylinders and/or cups to measure volumes of water. • Collaboratively develop tables to show a variety of obtained data. • Present obtained data using a variety of appropriate graph types. • Present ideas describing the role and importance of worms, bacteria and fungi in maintaining soil health.

MATHEMATICS: • MA3-1WM: A student describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions. • MA3-11MG: A student selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity. • MA3-18SP: A student uses appropriate methods to collect data and constructs, interprets and evaluates data displays including dot plots, line graphs and two-way tables.	
Any safety issues to be considered: • It is important that students do not inhale or taste the soil and they should be instructed to wash their hands after all activities involving touching the soil or chemicals used in the investigations. • If using cut PET bottles, students should not have access to knives or any other cutting implement. • During the erosion investigations, water may spill, so care should be taken with potential slips, trips and falls.	**Resources:** • Camera/video equipment to record student experiences • Samples of at least three different types of soils – including sandy, loamy and clayey soils • Measuring cup/measuring cylinder • Plastic funnel, or cut PET bottle (top half) • PET bottles, cut in half lengthwise • Watering can • Old flat biscuit/baking tray, or other flat metal tray or trough • Plastic tray or crate/trough • Tea bags to be used for Tea Bag Index project – supplied by the University • Marker spikes to put into ground to mark where tea bags are buried • Different images of landscapes, showing soil erosion and activities designed to successfully reduce soil erosion

LESSON SEQUENCE

Lesson content	Teaching strategies / learning experiences:	Resources and organisation:
1. Review work covered in previous lesson sequence on the importance of soils and what we mean by soil health. Also review the role of worms and microorganisms in maintaining soil health.	1. Review word wall and note any additions. 2. Alternatively, use class *Kahoot* game to review previous material. Questions may relate to types of soil and best soil to use for growing certain vegetables and/or plants; how worms and microorganisms contribute to the maintenance of a healthy soil; the use of compost and how to make a compost bin/pile.	1. Kahoot access: https://getkahoot.com/how-it-works
2. What happens when it rains heavily and soil gets washed away? [Tabulation of data obtained should commence here] [Video recording of students' investigations should commence here]	1. Class discussion on what causes soil to move around an area and develop a definition of 'soil erosion'. 2. Use the method in the clip to model soil erosion, or set up an activity as shown. 3. Discuss with students some possible ways of reducing soil erosion and develop the comments to consider the importance of plant coverage.	1. YouTube clip on modelling soil erosion: https://www.youtube.com/watch?v=YETdZyZI6es 2. For an alternate activity, set up the following:  (Fox,J & McCarthy,L. 1984)
3. Investigating how we can control soil erosion.	1. Set up three PET bottles as shown in the You Tube clip and students can measure the amount of run off from each bottle, tabulate their results and draw column graphs, with teacher support if necessary. 2. An alternative method of controlling soil erosion can be demonstrated using furrows within the soil. Class discussion may then follow, linking this to farming	1. You Tube clip: https://www.youtube.com/watch?v=im4HVXMGI68 This is an excellent demonstration of the importance of ground cover in stabilising soils. Quick growing seeds will need to be planted as soon as the unit is commenced, to ensure that there are sufficient plants to provide a good ground cover and hence, reduce the water run-off.

	practices in some hilly areas, such as in Indonesia and South America, where crop growth occurs on the sides of mountains, because of the suitability of the volcanic soils found there.	2. Demonstrate the use of furrowing in farming by setting up this following demonstration:  (Fox,J & McCarthy,L. 1984)
4. Final review of soil unit.	1. Class discussion on what has been considered so far – consider the word wall and the investigations related to the properties of soils, different plants needing different types of soils, what constitutes a healthy soil and how we can measure soil health, the role of decomposers in the soil and how we can control soil erosion and removal of soil. 2. As a final review activity, students may like to carry out any of the following tasks: a) Write an article to the local newspaper or school magazine outlining what they have learnt about soils as a result of taking part in the Tea Bag Index activity. b) Design a suitable structure to act as a worm farm, or community garden for the school. c) Email local councillors outlining how soil can be looked after in the local area, especially around building sites. d) Present a video collage or video recording of student experiences throughout the unit on soils. This could be presented at the school/stage assembly. e) Interview a member of the University of Sydney soil science team to find out more about their research and how they are working to improve soil quality in Australia.	