YEAR 1
STEM Project

Science Technology Engineering and Mathematics

(STEM) Projects – Teacher's Guide

PALMS
PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

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STEM Project - Teacher's Notes

How To Use This Resource

The PALMS STEM projects are designed to be used to either supplement normal science lessons in the Earth and Space Science area or as stand-alone projects with science classes, STEM clubs or extension classes.

This Year 1 STEM Project differs from the PALMS STEM projects for Years 4-6 in recognition of the abilities of younger students. This project is more teacher-guided with shorter preliminary activities designed to stimulate students thinking about the topic and the accompanying Student Booklet provides areas for students to record their findings and results, where appropriate, for the activities described in this Teacher's Guide.

To assist teachers to introduce students to the STEM Skills they need to be using when working on STEM projects, an accompanying PowerPoint presentation titled 'What do STEM Skills look like?' has been prepared. This can be discussed with the students before starting the main project. It should be reinforced that we are not asking them to think of ways to address the scenarios presented in this resource, but to identify the skills they would use. The STEM skills discussed here align with the WA Department of Education definitions found here:

https://www.education.wa.edu.au/what-is-stem-

Students can be asked at the end of the project to identify which STEM skills they have used, to increase their overall understanding of the importance of these skills.

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Observing My Changing World

Introduction

Humans have been observing changes in the sky and landscape for a very long time. Observations of these changes have been recorded through art, stories and written scientific works. This STEM project continues that tradition of observing the sky and landscapes, something young students tend to do naturally as they grow and learn.

Whilst this project focuses on the Australian Curriculum Earth and Space Science sub-strand it also aligns with the Science as a Human Endeavour dot point: '*Science involves observing, asking questions about, and describing changes in, objects and events (ACSHE021)*'.

Observation is a critical skill in science and students should be encouraged to use their senses to make observations. As humans we commonly rely strongly on our sense of sight but in science it is important to use our full range of senses, when safe to do so. Students' natural curiosity and eagerness to find out more about their world is something that comes to the forefront in STEM projects.

A large part of this project focuses on describing landscapes using the terms *Natural*, *Managed* and *Constructed*. Explanations for these terms are below:

- *Natural* landscapes – features that already existed before humans entered the landscape. Those that have been only slightly affected by humans. Features such as mountains, rivers, volcanoes, beaches, oceans, and forests would be classified as *Natural* landscapes. Truly, *Natural* landscapes are difficult to find as humans typically impact

any landscape they have access to.

- *Managed* landscapes – those that occur naturally but are maintained or modified by humans to suit their purposes. Examples of *Managed* landscapes include paths in National Parks, grassed areas, gardens and farming areas.

- *Constructed* landscapes – those that have been built by humans. Features of *Constructed* landscapes include buildings, roads, dams, railways, mines, pipelines, and ports.

When considering changes in the sky and landscape, there is also a broad range of timescales to be considered. Some changes, such as the location of constellations in the night sky, can be relatively fast when compared to changes in landscape features, such as rocks, which can take millions of years. In Year 1, students may not yet understand the very large numbers associated with some of these changes but can at least start to appreciate the difference between fast and slow changes.

This STEM Project is presented as a series of short preliminary activities to help students practice and improve their observation skills and assist them to think about the timing of changes they observe in the sky and landscapes. A longer project, which ties together many of the ideas presented in the preliminary activities, is included towards the end of this guide. As well as a list of keywords used throughout this project to assist with the preparation of a word wall (Appendix 1). Students may like to add to this list as they progress through the project.

Each of the preliminary activities and the longer project are designed to be used as standalone resources and can be adapted to suit your students' abilities and requirements. You can choose to complete one or all the

activities within your classroom. The accompanying Student Booklet contains supporting worksheets for activities, where relevant.

We hope you and your students enjoy this PALMS 'Observing My Changing World' resource!

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Short Preliminary Activities

This series of short activities will help students to start thinking about observing changes in the sky and landscape.

Natural, Managed or Constructed?

This activity is a card sorting game that will assist students to recognise the features of natural, managed and constructed landscapes.

If you would like to have students practice identifying the different types of landscapes and their features, prior to undertaking this activity, a series of example photographs can be found in the Year 1 area of the PALMS website - https://www.palms.edu.au. These could be worked through as a class.

There are twelve photographs from around Australia representing examples of each of the three types of landscapes. We recommend choosing a smaller selection of the cards with students, suitable to your context. The full card selection is included in Appendix 2 and smaller versions are on the next page. Cards can be printed from the appendix or displayed electronically. Note that cards can be printed double-sided, so locations are written on the back of the cards.

Some suggestions for how you might approach this activity with students:

- Without explaining what the different types of landscapes are, give students the cards and ask them to group the cards that are similar to each other. Ask the students why they have put the cards into the groups they have. Discuss the things they are seeing in each of the photos. This will facilitate students looking at the cards closely, to describe the landscape features. You might then go on to define what natural, managed and constructed landscapes are and students

can nominate examples of each from the cards.

- Start with a discussion around what natural, managed and constructed landscapes are. Then give students one card from each landscape type and ask them to work out which example is which type of landscape, carefully thinking about the features that make it that type of landscape. What are the things that are present or missing in the landscape to make it defined as that type?

- Play a game in small groups after discussing the three different landscape types. The aim of the game is to collect two cards for each landscape type. The cards should be placed face down and students take turns to turn over one card. If they are unsure what kind of landscape the card shows, the group should discuss and help work this out. If the student does not have this landscape type, they can pick up the card and the next student takes a turn. If they already have it, they should turn it back over and it is then the next student's turn.

After playing the card sorting game, you might like to get students to think of examples and take photographs of natural, managed and constructed landscapes in your local area. You may even like to organise to visit these landscapes.

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Natural Landscapes

Managed Landscapes

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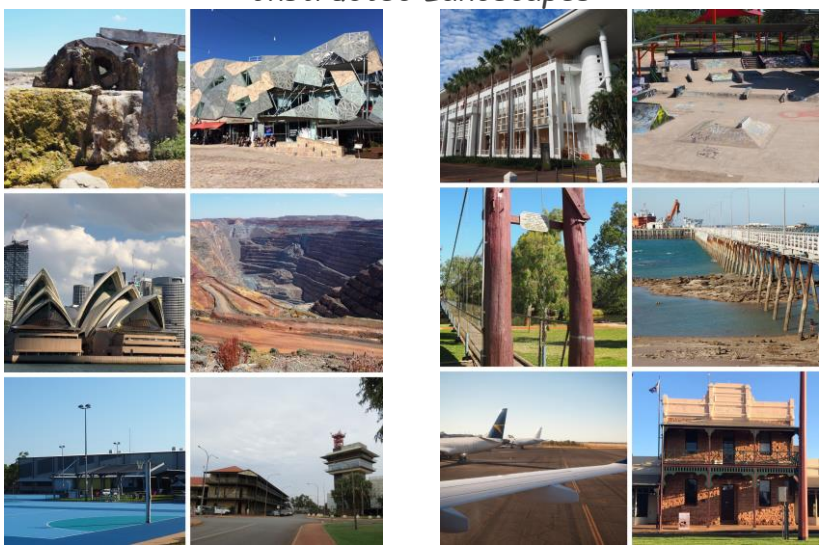
Constructed Landscapes



Now and Then

Landscapes change over time. This can be over a short or longer period of time. These changes may occur in natural, managed, or constructed landscapes. If you have some building work or landscaping occurring in the gardens at school, this is an ideal opportunity for students to observe and record the changes over time.

To introduce this activity, view this timelapse video of the changes occurring to a section of Barter Island in Alaska and discuss with students what changes they observe: https://youtu.be/k2AQnpcW_HY
There are other examples of timelapse videos of changes in landscapes listed in Appendix 4.
You may even like to film your own timelapse video of a local landscape that the students may be familiar with. Many phones and tablets will have a camera setting to assist with this.

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After the discussion, choose a view that all students can see. This may be the view out of a classroom window or an area outside, where the class can sit for a period of time. Using the *Now and Then* worksheet in the Student Booklet, ask students to draw a detailed picture of what they can see. Students should label all features of their picture and include the date the picture is drawn.

Features they may label in their diagram include:

- tree
- lamp post
- fence
- plant
- sign
- building
- car
- cloud
- sky
- bird
- footpath
- Sun

Once students have completed their drawing, ask them to complete a think-pair-share with a partner about what the same view of the landscape would look like at *nighttime*. Once they have finished discussing what it would look like with their partner, students should then draw a picture of the nighttime landscape.

The next step is for students to complete a second think-pair-share with a partner about what the same view will look like the *next lesson* (preferably this would be on a different day). Students should then complete a labelled drawing in the next box on the worksheet.

During the next lesson, discuss with the class which parts of the view appear as they were drawn in the previous lesson (e.g., built objects such as fences or signs and the more fixed landscape features such as trees) and which parts have changed (e.g., weather features such as clouds, any animals they may have included).

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Extension activity ideas

- Access old photographs of your school if possible. Photographs of school buildings or playgrounds are ideal. Ask the students what they can see has changed.
- If you have a local history association, they may be able to present to your class on changes in the local area.
- If you able to contact an older person who has lived in the area for some time, the students may be able to interview them about what changes they have seen. This may even be possible with former students from your school.

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Observing Changing Weather

Hourly or daily changes in the weather can be observed by students during class time. Many books typically read in Year 1 are related to the weather and the topic is also covered in their HASS studies. Making weather observations is a great way to get students using some of their numeracy skills also.

For this activity, students will set up a class weather station, including some instruments that they have made themselves. An example of a challenge you could set students is to design the best rain gauge from recycled materials and test it. They should consider:

- material choice - durability, will it fall over?,
- accuracy of scale - if you put rocks in the bottom to weigh it down, is the scale still accurate?
- is it safe for animals and insects?

In the Weather Changes topic of the Year 1 PALMS Resources, there are several examples of measurement instruments for students to construct:

- Range of simple wind direction tools
- Build Your Own Weather Vane - PPP
- Rain, Clouds and Rainbows (Make a Rain Gauge)

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The one instrument that you won't be able to construct is a thermometer or temperature probe. Low-cost thermometers can be purchased from hardware stores or garden centres. Ensure that the thermometer you choose is suitable to be used outdoors and if it is a glass one, make sure it is in a durable holder to protect it. Depending on your budget, it may even be possible to purchase a weather station that combines several individual instruments in one device.

Once you have purchased or constructed a weather station, set up a roster for students to read the instruments at the same time each day. Students will love being given a responsibility and it is a great way for them to demonstrate some of their mathematics and science inquiry skills. As well as taking measurements of temperature, amount of rainfall and wind direction, students could also be asked to describe what the sky looks like and if they can hear the wind.

- Are there clouds?
- What do the clouds look like – colour, shape and size?
- Is there a rainbow?
- Can you see the Sun?
- How loud is the wind?

Students should record their weather measurements and observations on a class table or chart each day which could then be discussed in science lessons. Part of the discussion could include comparing their measurements to forecasts for your area or recorded temperatures (from news reports or the Bureau of Meteorology website: http://www.bom.gov.au/) for nearby locations. You may even like to compare the students' observations to different areas in Australia or even the northern hemisphere.

A suggested table for students to record their observations is included in the accompanying Student Booklet.

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Observing Changing Seasons

In Western culture, the change of seasons is usually marked by set dates in the calendar, following a cycle of four seasons over a year. In the North of Australia, only two seasons are observed (generally) – the Wet and the Dry. We know that seasons are very different across the world, so whilst the same four seasons are observed in many places they may be experienced in different ways (and at different times).

Aboriginal and Torres Strait Islander people mark the seasons by observing changes in their local environment such as those in the weather, plants and animal behaviour. This means that seasons are specific to the area in which they live. The Bureau of Meteorology Indigenous Weather Knowledge website (http://www.bom.gov.au/iwk/) and this CSIRO website (https://www.csiro.au/en/research/natural-environment/land/About-the-calendars) show a range of examples of local area seasons calendars and provide further information.

Students can draw how they perceive the four seasons of Summer, Autumn, Winter and Spring on the *Observing Seasons* worksheet in the Student Booklet. They may need some assistance to add in which months of the year those seasons are in. What features in their drawings tell them which season it is? Discuss with students what season it is now where they are and what season it is in the Northern Hemisphere.

If possible, find out the seasonal calendar of Aboriginal people in your local area. Ask students to add this calendar to their worksheet. What changes in the natural landscape would show the next change of season in this calendar? This is a great opportunity to engage with local Aboriginal and Torres Strait Islander people, if possible, and to ask them to share their seasonal knowledge and stories with the students.

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Observing Night Sky Changes

NOTE: Aspects of this activity will be partly dependent on your ability to observe any of the following events in the sky due to timing, weather conditions, access to equipment and location.

Humans have been observing the night sky for a very long time and many of these observations are believed to have given rise to the cultural stories, myths and legends of different civilisations.

Events in the sky that can be observed may be things such as solar and lunar eclipses, meteorites, meteor showers or comets that can be seen from the surface of the Earth. Some of these events have predictable patterns that scientists have discovered, meaning that they can predict when the next event will occur.

Firstly, a few definitions to clarify some common misconceptions:

- *Comet* – objects made of ice and dust that orbit the Sun. A comet has a 'tail' caused by the ice and dust vapourising when its orbit brings it close to the Sun.
- *Asteroid* – small rocks (smaller than planets but larger than pebbles) that orbit the Sun, sometimes coming close to Earth within those orbits.
- *Meteoroid* – small pieces of rock travelling through space. They come from comets or pieces that break off when asteroids smash together.
- *Meteor* – a meteoroid (space rock) that enters Earth's atmosphere and burns up, giving off light. They are commonly called 'shooting stars' even though they're not stars at all.
- *Meteorite* – any meteoroid that survives its journey through Earth's atmosphere and lands on Earth. Meteorites are of great interest to scientists and are often in places like museums.

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The NASA Space Place website (https://spaceplace.nasa.gov/) is a good resource for simple to understand explanations of many space-related topics.

Listed below are some events that may be possible to view and discuss with students. Even if you can't view them, your students may be interested in finding out more about them.

Meteor or comet observation

A good example of a comet that has a predictable pattern of visibility from Earth is Halley's Comet.

This Photo by Unknown Author is licensed under CC BY-SA

Named after English astronomer Edmund Halley, the comet can be seen every 75-76 years and was last seen in 1986. It is predicted to be visible again in 2061 as its orbit brings it close to Earth. The following websites provide some history of viewing Halley's Comet:

- https://www.space.com/19878-halleys-comet.html
- https://en.wikipedia.org/wiki/Halley%27s_Comet
- This video explains what comets and meteors/meteorites are and also mentions Halley's Comet https://youtu.be/02wrLS-ue1Q

Another event with a predictable pattern is the annual Geminids meteor shower. A meteor shower is when many meteoroids enter Earth's atmosphere at once, showing as glowing streaks across the night sky.

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Unfortunately, the Geminids meteor shower is usually visible late at night or in the early hours of morning in December each year, but you could still discuss the event with your class and there are often news reports of the event that include video footage. The following websites provide more information on the Geminids meteor shower:

- General information including dates of previous showers https://en.wikipedia.org/wiki/Geminids
- Information on the 2021 event with tips on how best to view https://www.abc.net.au/news/science/2021-12-12/geminids-meteor-shower-2021-australia-astronomy-guide/100632500

The Fireballs in the Sky citizen science program allows the general public to report sightings of objects burning up in Earth's atmosphere, fireballs, which may be meteors. The reported sightings assist the research of scientists of the Desert Fireball Network at Curtin University in Perth. Scientists investigate the reports and this has led to several meteorites being located and retrieved.

Their research also links to the Global Fireball Observatory which tracks meteor sightings all over the world. The program website contains a useful FAQ section and a range of teaching resources on the theme of Fireballs in the Sky (http://fireballsinthesky.com.au/).

Eclipses

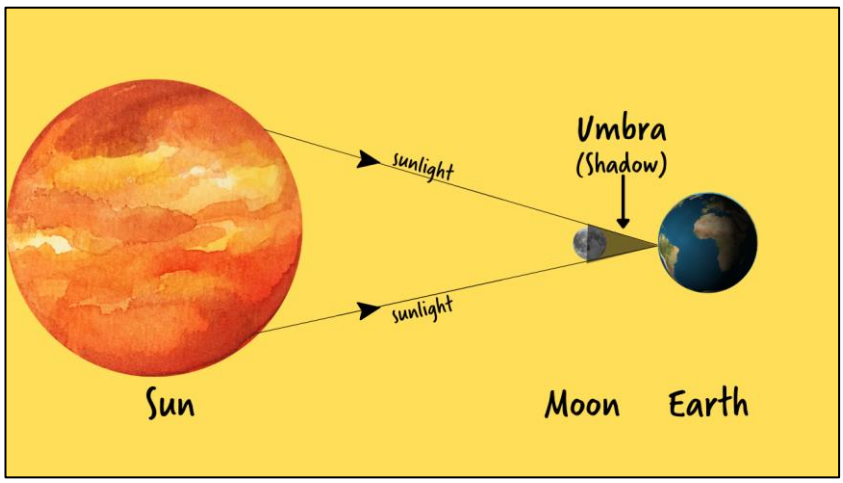
An eclipse is when the light from one celestial object (e.g., the Sun) is fully or partially blocked by another celestial object. Scientists can predict

when eclipses will occur as they know the speed that the Earth is orbiting the Sun and the Moon is orbiting the Earth. There are two types of eclipses we can observe – solar and lunar.

A **solar eclipse** occurs when the Moon is between the Sun and the Earth, blocking the light from the Sun and causing it to get darker on Earth. These eclipses are observed during the day. As the Moon is very small compared to the Sun and the Earth, it only casts a small shadow so just a small area on Earth will experience a solar eclipse. A total solar eclipse (when the Moon completely covers the Sun) occurs approximately every 18 months and partial eclipses (when only part of the Sun is covered) occur at least twice a year. To see an eclipse, you have to be in the right place on the sunny side of Earth at the right time.

SAFETY NOTE - Never look directly at the Sun as this can permanently damage your eyes. Special equipment is required to view a solar eclipse.

TOTAL SOLAR ECLIPSE



(diagram not to scale)

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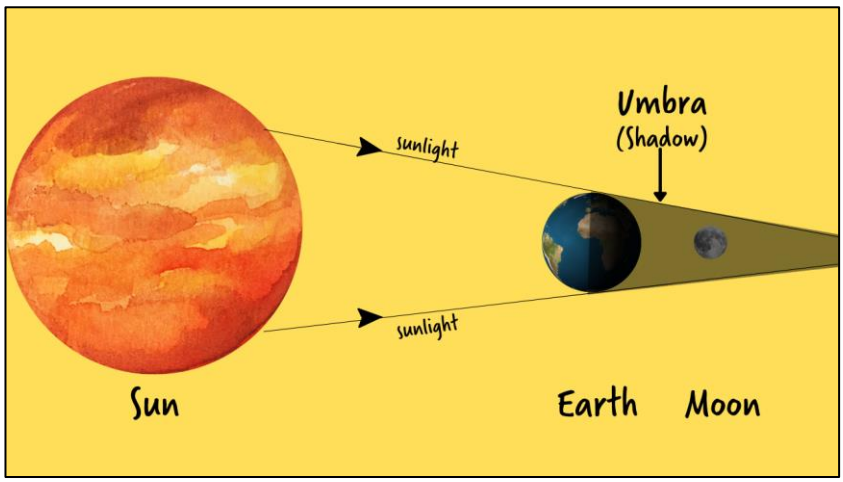
A lunar eclipse occurs when the Earth is between the Sun and the Moon. The Moon has no light of its own – we only see it because it is illuminated by the Sun. A lunar eclipse occurs because most of the light from the Sun is blocked by the Earth, so the Moon is in the Earth's shadow. They can only occur when the Moon is full and is observed at night. During a lunar eclipse, some sunlight can still reach the Moon so it looks red from Earth due to the sunlight passing through the edge of Earth's atmosphere.

Lunar eclipses are the most commonly observed eclipses as the event is visible to more areas on Earth, therefore more people can see it. They occur at least twice a year.

TOTAL LUNAR ECLIPSE



(diagram not to scale)

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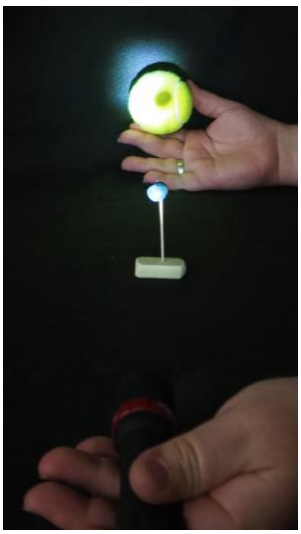
You can demonstrate how eclipses occur using a lamp or large torch to represent the Sun and two spherical objects of different sizes to represent the Moon and the Earth (e.g., a blueberry and a tennis ball, Styrofoam balls or a golf ball and a basketball).



Movement of constellations across the night sky

Constellations of stars can be observed moving across our night sky as the Earth rotates and turns towards or away from them. They will also appear in different positions in the sky throughout the year due to the Earth's orbit around the Sun.

Some suggested activities to engage students in observing these changes in the night sky include:

- Asking an astronomer to come and talk to your students. If an in-person visit is not possible, perhaps an online meeting would be. University outreach departments or astronomy clubs may offer this.
- Arrange a visit to a local observatory or planetarium, if available.
- The Stellarium app offers a virtual tour of the night sky. It can be downloaded onto a phone or tablet. It is also available to download onto a computer but this version can be a bit tricker to use (https://stellarium.org/)

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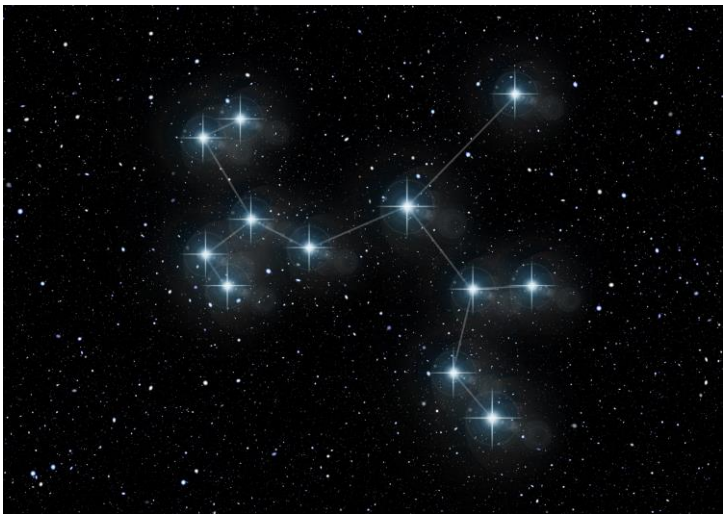

Observing Changing Landscapes

Changes in natural landscapes will often occur over very long periods of time. Natural features such as rock formations, mountains, valleys, rivers and lakes may take hundreds, thousands or even millions of years to change in appearance so these changes are not always easily observed in a human lifetime.

An example of processes that can cause changes in landscape features such as rocks is weathering. Weathering is when physical, chemical or biological processes cause rocks to be broken down into small pieces. Another process, called erosion, is when these small pieces of rock are moved away from where they weathered. Weathering and erosion are topics covered by students in the Year 4 curriculum, however they are relevant to Year 1 also as they cause changes in the landscape.

A simple experiment to help students observe changes (or lack of) in landscapes is to use the action of water dripping. Student observations can be recorded in the worksheet contained in the Student Booklet.

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Materials

- Three shallow containers or plates per student or small group
- Eye droppers or plastic pipettes
- Ruler
- Water – approx. $\frac{1}{2}$ cup
- Clean sand - approx. $\frac{1}{2}$ cup
- Rock - one tennis ball-sized rock or approx. $\frac{1}{2}$ cup of pebbles)
- Sugar or salt – approx. $\frac{1}{2}$ cup (Alternative – 10 sugar cubes)

Method

1. Prepare three different landscape models by forming piles of each material (sand, rock and sugar/salt) in separate containers. If using a larger rock, just place this in one of the containers. TIP: Pour the sand and sugar/salt slowly to form a mound on the container.

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2. Ask students to draw what the three models look like on the worksheet.

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3. Demonstrate use of eyedroppers to students then ask them to add 20 drops of water, holding the droppers directly above the centre of the model, at a height of approximately 15cm. Holding the ruler against the side of the container will help to make sure all the drops are delivered from the same height.

4. Ask students to draw what the landscapes look like after 20 drops of water. They should label any changes they observe.

5. Students can then deliver another 50 drops of water onto the landscape models from the same height and once again draw what they look like, noting any obvious changes.

6. To complete the experiment, students can pour any remaining water onto the landscape models, ensuring it is poured from the same height the drops were delivered from.

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Optional – a camera or tablet may be used to take photographs rather than having students draw their observations.

Discussion questions

- Which landscape; rock, sand or sugar/salt, was changed the most after 20 drops of water?
- Which landscape model changed the most after 50 drops of water and after pouring the rest of the water over it?
- Describe what happened when you dropped the water on the rock. How about the sand and the sugar/salt?
- Why does the water wear away (weather) the sugar/salt and the sand more easily than the rock?
- How long do you think it would take for the water to change the shape of the rock?
- Can you think of an example you have seen where water has worn away (weathered) something really hard like rocks? (If you live by the coast, there may be some rocks or cliffs at the beach that have been worn smooth. Another good example of weathering is the concrete or sand under a downpipe that has been worn away by water dripping for a long time).

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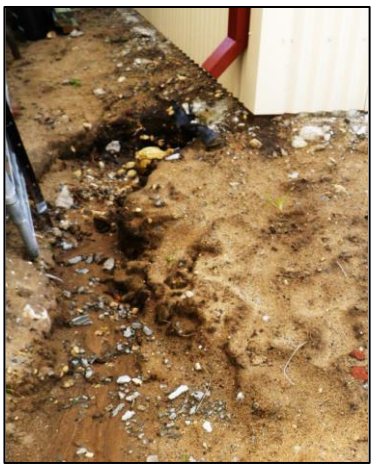

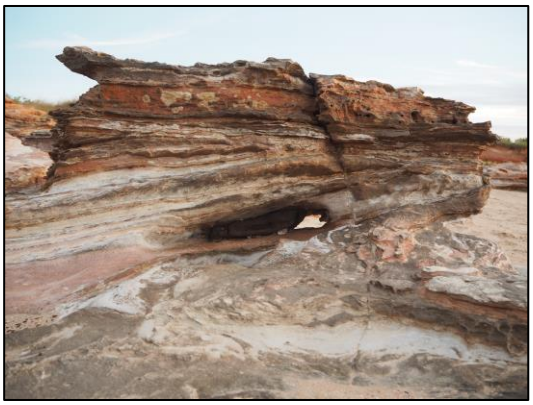

Longer experiment -

- Suspend PET bottles (at the same height) with holes in their lid (same number) over the three materials and allow water to drip on them. Leave the experiment running for as long as possible, perhaps even refilling the bottles to see how long materials take to weather or wear away. Alternatively, you might like to place your materials in a garden area that has reticulation, such as a drip system, to best utilise the water. Record changes by taking photographs at set intervals.
  Hint: A softer type of rock, such as a limestone you can crumble with your fingers, would be good to use to allow students to see a result.

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Longer Project - Time Capsule

A project that will take a bit longer to complete is to make a time capsule for your class or school, incorporating some of the elements that students have worked on in the preliminary activities. This project may even be able to tie in with a larger project across many year groups and subject areas or an anniversary celebration for your school.

Things to consider when completing this project:

- Location – where will the time capsule be located in the school grounds?
- Timing – how long should the time capsule remain sealed for?
- Materials – what should the actual time capsule be made of to ensure it will last for the time it will be sealed?
- Design – what should it look like?
- Contents - what to put inside the time capsule.

Included below are some suggestions on each of these considerations. The National Archives of Australia website also contains some useful tips for long-term storage of time capsules - https://www.naa.gov.au/information-management/storing-and-preserving-information/preserving-information/creating-time-capsule

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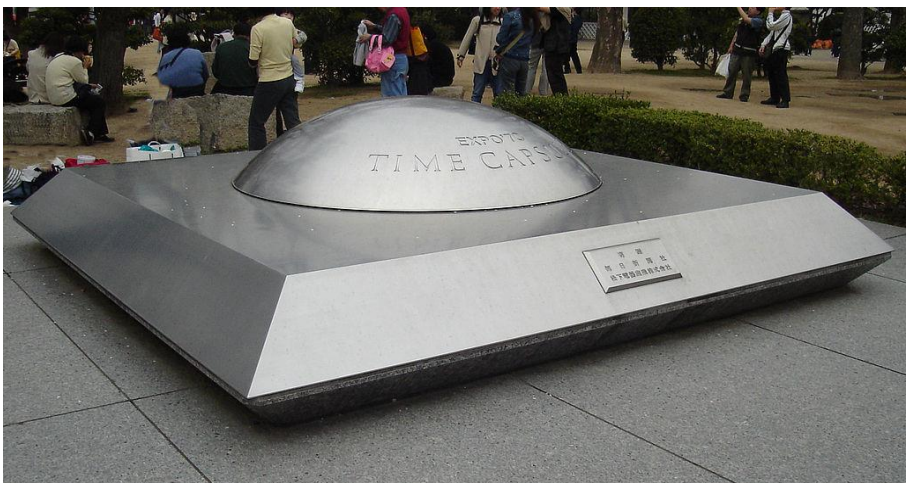
Location

There is nothing worse than being unable to find a time capsule buried on school grounds ten years ago because staff have moved on and the location was not well recorded. Add to that the pressure of a significant celebration or anniversary for the school and it will cause added stress!

In choosing the location for your time capsule, consider an area that is not flagged for future building work and is unlikely to be disturbed. Traditionally time capsules are buried underground but this can lead to the aforementioned issues and also limits your choice of materials. Perhaps your school has a storage or archive room that could be used. Depending on the size of your capsule, it may even be mounted on the wall, becoming a form of art installation!

The most important consideration in the location of your time capsule is that the location is secure, well-marked and documented in a place that will be easily found by anyone in the future. It should also be clearly labelled with what it is and when it should be opened.



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Timing

How long do you want to leave the time capsule sealed for – one school term, one year, several years? When you start this project may also factor into your decision on how long to store the time capsule for.

If you are able to plan this project as part of a larger integrated piece of work, perhaps you could plan to open the time capsule when students are in Year 6 or Year 10 and are leaving the school so they can reflect on their time there. This may become a perpetual project to celebrate graduation of students.

However long you choose, this will affect the kinds of things you include in the time capsule and whether all students will get to observe the final results.

Materials and Design

The students can be involved in deciding the design and even testing materials that can be used to construct the time capsule. If you are considering a long-term storage of the time capsule, the materials must be durable and keep out light, dust, and insects.

Short-term storage, such as for a term or year, will not limit material choices or location quite as much as materials won't necessarily need to be as durable. Containers such as cardboard or plastic boxes or large glass containers with lids would be ideal.

Some other factors to consider for any design are budget constraints, location of the time capsule, size and perhaps if the materials are eco-friendly.

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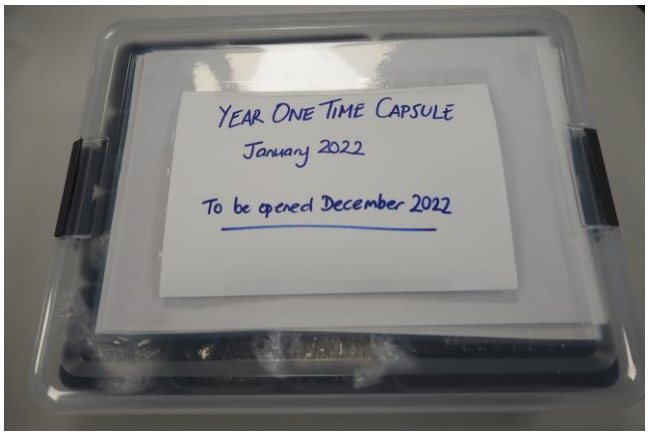

Contents

The most important part of this project, which ties into earlier preliminary activities, is what will be included in the time capsule. Here are some suggestions:

- Photographs, drawings, plans or maps of what different areas of the school look like now.
- Students' predictions of what the school will look like in the future.
- Some of the diagrams students drew in the Now and Then activity with a clear description of where this view is located in the school. This will allow for a comparison when the time capsule is opened.
- Observations of the weather for the week prior to sealing the time capsule, including what season it is.
- Observations of the night sky for the week prior to sealing the time capsule.
- Student accounts of any events that happened recently, such as eclipses or meteor showers.
- A rock (or several) with measurements of its size and weight and a description of its appearance, perhaps even a photograph. This is to show it won't change over a short time. You could even consider leaving the rock outside the capsule to see the effect of weathering over time.

STEM Project - Teacher's Notes

- Examples of any of the weather observation instruments that students made and used.
- The front page of the newspaper on the day the capsule will be sealed or the page showing the weather forecast.
- A list of objects in the capsule and why they were included.
- Photos of the students involved in the project (with parental permission for these to be included, especially if considering longer-term storage).

Some special considerations that should be made, especially if the plan is for the time capsule to remain sealed for a long time include:

- Making sure all objects included are completely dry.
- Any paper included is good quality, perhaps acid-free or archival quality paper. Newspaper print potentially won't last but photocopies could be included of the articles. In fact, newspaper is an interesting thing to include to note how it changes over time although not directly related to changes in the landscape and sky.
- Try not to include items requiring computers or technology to view if looking at several years storage as the technology to view it may not be available in the future.
- Place heavier items or objects that need to remain flat at the bottom.

When the time capsule is opened, students could repeat some of the observations that were recorded from the preliminary activities to compare results.

The ideas presented here are just some suggestions to get your students thinking about the possibilities for this longer project. They may like to add other contents to the time capsule as long as they keep in mind that the overarching idea is to observe changes in the sky and landscape.

YEAR 1 STEM PROJECTS Appendices

Appendix 1

Observing My Changing World Project Keywords

observation	Sun	northern	comet
observe	Moon	southern	star
landscape	time	calendar	constellation
natural	view	Aboriginal	astronomer
managed	timelapse	traditional	day
constructed	weather	sky	night
built	weather station	story	predict
man-made	rain	myth	measure
environment	wind	legend	change
feature	direction	event	short time
change	temperature	eclipse	long time
day	season	meteor	pattern
night	hemisphere	meteorite	time capsule

YEAR 1 STEM PROJECT - Appendices

Appendix 2

Cards for 'Natural, Managed or Constructed?' activity

NATURAL

AUSTRALIAN EARTH SCIENCE EDUCATION

Casuarina, NT

AUSTRALIAN EARTH SCIENCE EDUCATION

Cocos Islands, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Blue Mountains, NSW

AUSTRALIAN EARTH SCIENCE EDUCATION

Lesmurdie Falls, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Pemberton, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Nourlangie, NT

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NATURAL

AUSTRALIAN EARTH SCIENCE EDUCATION

Scarp Pool, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Karratha, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Harts Range, NT

AUSTRALIAN EARTH SCIENCE EDUCATION

East Alligator River, NT

AUSTRALIAN EARTH SCIENCE EDUCATION

Murray Mallee, SA

AUSTRALIAN EARTH SCIENCE EDUCATION

Litchfield National Park, NT

(termite mound)

PALMS

PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

Santos & ESWA supporting earth science education

YEAR 1 STEM PROJECT - Appendices

MANAGED

AUSTRALIAN EARTH SCIENCE EDUCATION

Hunter Valley, NSW

AUSTRALIAN EARTH SCIENCE EDUCATION

Gnarabup, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Albany Wind Farm, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Adelaide Hills, SA

AUSTRALIAN EARTH SCIENCE EDUCATION

Blue Mountains, NSW

AUSTRALIAN EARTH SCIENCE EDUCATION

Goomalling, WA

PALMS
PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

Santos & ESWA supporting earth science education

YEAR 1 STEM PROJECT - Appendices

MANAGED



AUSTRALIAN EARTH SCIENCE EDUCATION

S&R orchards, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Marrakai, NT



AUSTRALIAN EARTH SCIENCE EDUCATION

Darwin, NT

AUSTRALIAN EARTH SCIENCE EDUCATION

Bells Rapids, WA



AUSTRALIAN EARTH SCIENCE EDUCATION

Derby, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Adelaide Hills, SA

PALMS
PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

Santos & ESWA supporting earth science education

YEAR 1 STEM PROJECT - Appendices

CONSTRUCTED






AUSTRALIAN EARTH SCIENCE EDUCATION

Cape Leeuwin, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Melbourne, VIC

AUSTRALIAN EARTH SCIENCE EDUCATION

Sydney, NSW

AUSTRALIAN EARTH SCIENCE EDUCATION

Kalgoorlie, WA

AUSTRALIAN EARTH SCIENCE EDUCATION

Darwin, NT

AUSTRALIAN EARTH SCIENCE EDUCATION

Port Hedland, WA

PALMS
PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

Santos & ESWA supporting earth science education

YEAR 1 STEM PROJECT - Appendices

CONSTRUCTED




PALMS
PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

Santos & ESWA supporting earth science education

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Appendix 3

Year 1 Australian Curriculum links

Note: All curriculum areas may not be covered by each student depending on how the project is organised and assigned.

Science	Technology*	Engineering*	Mathematics
Science Understanding Chemical Sciences Everyday materials can be physically changed in a variety of ways (ACSSU018) Earth and Space Sciences Observable changes occur in the sky and landscape (ACSSU019) **Science as a Human Endeavour** Nature and development of science	**Technologies and Society** People produce familiar products and services to meet personal and community needs (ACTDEK001) **Digital implementation** Share and publish information in a safe online environment, with known people (ACTDIK006)	**Materials and technologies specialisations** Characteristics and behaviours of individual materials used in products (ACTDEK004) **Designing** Develop and communicate design ideas through describing, drawing, modelling and/or a sequence of written or spoken steps (WATPPS07)	**Number and Algebra** Recognise, model, represent and order numbers to at least 100 (ACMNA013) Recognise and describe one-half as one of two equal parts of a whole (ACMNA016) **Measurement and Geometry** Measure and compare the lengths and capacities of pairs of objects using uniform

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Science involves observing, asking questions about, and describing changes in objects and events (ACSHE021) Use and influence of science People use science in their daily lives, including when caring for their environment and living things (ACSHE022) **Science Enquiry Skills** Questioning and predicting Pose and respond to questions, and make predictions about familiar objects and events (ACSIS024)	**Representation of data** Data can have patterns and can be represented as pictures, symbols and diagrams (ACTDIK002) **Producing and implementing** Use given components and equipment to safely make solutions (WATPPS08)	**Collaborating and managing** Work independently, or collaboratively when required, to organise information and ideas to safely create and share sequenced steps for solutions (WATPPS15) **Investigating and defining** Explore opportunities for design (WATPPS06)	informal units (ACMMG019) Tell time to the half-hour (ACMMG020) Describe duration using months, weeks, days and hours (ACMMG021) Give and follow directions to familiar locations (ACMMG023) **Statistics and Probability** Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or

YEAR 1 STEM PROJECT - Appendices

Planning and conducting Participate in guided investigations to explore and answer questions (ACSIS025) Use informal measurements to collect and record observations, using digital technologies as appropriate (ACSIS026) Processing and analysing data and information Use a range of methods to sort information, including drawings and provided tables and through discussion, compare observations with predictions (ACSIS027)			'might happen' (ACMSP024) Choose simple questions and gather responses and make simple inferences (ACMSP262) Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays (ACMSP263)

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Evaluating Compare observations with those of others (ACSIS213) Communicating Represent and communicate observations and ideas in a variety of ways (ACSIS029)			

*Drawn from Design and Technologies and Digital Technologies curriculum

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Links to other curriculum areas

Humanities and Social Science (HASS)

- The location of the equator and the northern and southern hemispheres, including the poles (ACHASSK031)
- The natural, managed and constructed features of places, their location on a pictorial map, how they may change over time (e.g. erosion, revegetated areas, planted crops, new buildings) and how they can be cared for (ACHASSK031)
- How weather (e.g., rainfall, temperature, sunshine, wind) and seasons vary between places, and the terms used to describe them (ACHASSK032)
- How the present, past and future are signified by terms indicating time (e.g. 'a long time ago'; 'then and now'; 'now and then'; 'old and new'; 'tomorrow') as well as by dates and changes that may have personal significance (e.g. birthdays, holidays, celebrations, seasons) (ACHASSK029)
- Reflect on current understanding of a topic (e.g., think-pair-share, brainstorm) (WAHASS13)
- Explore points of view (e.g., understand that stories can be told from different perspectives) (WAHASS19)

English

- Explore differences in words that represent people, places and things (nouns, including pronouns), happenings and states (verbs), qualities (adjectives) and details such as when, where and how (adverbs) (ACELA1452)

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- Use visual memory to read and write high-frequency words (ACELA1821)
- Engage in conversations and discussions, using active listening behaviours, showing interest, and contributing ideas, information and questions (ACELY1656)
- Use interaction skills including turn-taking, recognising the contributions of others, speaking clearly and using appropriate volume and pace (ACELY1788)

YEAR 1 STEM PROJECT - Appendices

Appendix 4

References used in preparing this project

GENERAL INFORMATION

- Halley's comet observation
  - https://www.space.com/19878-halleys-comet.html
  - https://en.wikipedia.org/wiki/Halley%27s_Comet
- 2021 viewing information for Geminids meteor shower https://www.abc.net.au/news/science/2021-12-12/geminids-meteor-shower-2021-australia-astronomy-guide/100632500
- Aboriginal and Torres Strait Islander seasons
  - http://www.bom.gov.au/iwk/
  - https://www.csiro.au/en/research/natural-environment/land/About-the-calendars
- ACARA Teacher Background Information on linking observation of changes in sky and landscape to Aboriginal and Torres Strait Islander peoples knowledge https://australiancurriculum.edu.au/TeacherBackgroundInfo?id=56577

LANDSCAPE AND SKY TIMELAPSE VIDEOS

- Timelapse of constructed landscape (garden landscaping) that will become a managed landscape (14 min long) https://youtu.be/X9TbWLtJtgQ
- Timelapse of beach in the UK (observe tide, light level and amount of people using the area) https://youtu.be/CxZnO3ZTSMU

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- Timelapse of one day at Bondi Beach, NSW https://youtu.be/89y9phgG9yc
- USGS timelapse video of bluff erosion on Barter Island, Alaska which also shows changing season with snow melting at the start https://youtu.be/k2AQnpcW_HY
- Timelapse of a beach clean-up by 4ocean company (very short – 19 sec) https://youtu.be/SM3ens004dw
- Timelapse of Narrabeen Beach, NSW erosion due to storm https://youtu.be/WAv-c9zNCWM
- Timelapse of different locations, transitioning from day to night (focus is on sky) https://youtu.be/wIsVPZU8PXE

OTHER VIDEOS

- Video explaining what comets and meteors/meteorites are – mentions Halley's Comet https://youtu.be/02wrLS-ue1Q
- Magic School Bus – Rocks & Rolls – Ep 39 erosion and weathering https://www.youtube.com/watch?v=MU1tsmSoZmg
- Bill Nye – S05E14 – erosion https://www.youtube.com/watch?v=HkralMlDmSA
- Effect of water on landscape https://www.youtube.com/watch?v=qqsTS67BKmA (does only mention erosion)
- Video (short) on a very old barometer in Bendigo Art Gallery and how we used to measure the weather - https://www.abc.net.au/education/a-very-old-barometer/13633914
- Rainy weather – wet and cold vs wet and warm https://www.abc.net.au/education/for-the-juniors-wet-weather-in-cold-and-warm-climates/13633550
  Observing clouds to know when it's going to rain https://www.abc.net.au/education/for-the-juniors-how-do-you-know-when-rain-is-coming/13605556