Citizen Science – School Biodiversity Trail Lesson 4 – Years 7 & 8

Teacher preparation

Learning intentions:

- Students are able to select, research and communicate scientific and geographical information.

Success criteria: Students can…

- … support other students and/or community members to participate in citizen science programs.
- … share geographical and/or scientific information in a range of communication forms.
- … create templates for graphs, charts and tables.
- … justify their decision making.

> TIP: CONSIDER MAKING THE LEARNING INTENTIONS AND SUCCESS CRITERIA VISIBLE TO STUDENTS THROUGHOUT THIS LESSON.

Teacher content information: [ClimateWatch](#) is a citizen science initiative developed by [Earthwatch](#) that seeks to educate people from across Australia on the issue of climate change and empower them to contribute to solutions. Through its ClimateWatch program, Earthwatch works with educators to help them bring their experiences back to the classroom to foster new generations of environmental leaders. By incorporating ClimateWatch into curriculum, students and teachers will

become more knowledgeable about climate change and its impacts, and inspired to contribute to scientific and environmental efforts in their daily lives or future career path. These actions could range from community efforts to protect biodiversity through to encouraging others to be more involved in such activities. Increasing appreciation for the environment and scientific literacy in communities will empower long-term climate action as well as the development of adaptation and mitigation strategies.

Hot tips:

- This is the second lesson in a unit about creating a creating a school biodiversity trail. The full unit of lessons can be found here: [Citizen Science - Geography and Science - Years 7 & 8](#).
- This unit has been designed to be taught in either Geography or Science. To further enhance the learnings from this unit for students, consider teaching this as a cross-curricula unit of work.
- In this unit students create a 'school biodiversity trail' inspired by Earthwatch's [ClimateWatch Trails](#) for use now and in the future. Once the trail is established, future cohorts of students can complete this lesson (Lesson 1) and participate in a single biodiversity survey along the trail in a single lesson. If you are interested in furthering this process and establishing an official ClimateWatch Trail, visit the Create a ClimateWatch Trail page. To discuss the use of ClimateWatch Trails data in classrooms, feel free to contact climatewatch@earthwatch.org.au

Teaching sequence

5 minutes – Part A: Activating Prior Knowledge
60 minutes – Part B: Information for Citizen Scientists Visiting your School Biodiversity Trail
60 minutes – Part C: Information for Future Students Using your School Biodiversity Trail Data
60+ minutes – Part D: Testing the Packages
15 minutes – Reflection

**Work through this resource material in the following sequence:**

Introduction: Remind students that each student should take responsibility for collecting evidence and artefacts about the work that they put into the project, including drafts of everything they create as part of the project and records of any opportunities they pursue (either successfully or unsuccessfully).

Part A: Activating Prior Knowledge

Step 1. Invite students to share the work they have already completed creating their school biodiversity trail. Consider the following questions:

- Why have we created a school biodiversity trail? What is the purpose of this trail? (if needed, remind students of the ClimateWatch app and how it will be used to record species along their school trails)
- What steps have we been through to create our trail?
- What materials have we already created to support the citizen scientists using our trail?
- What might the next steps be?

Step 2. Explain to students that, in this lesson, they will be creating two packages of information to help others use their school biodiversity trail:
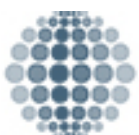
- Package 1 – Information for citizen scientists using the school biodiversity trail
- Package 2 – Information for citizen scientists analysing the data collected on the school biodiversity trail

Clarify with students that they be able to incorporate the information they have already created (e.g. maps, field guides and information about how to use the ClimateWatch app/site), create new information and also think about the best ways to present this information, based on the needs of the end users mentioned above.

Part B: Information for Citizen Scientists Visiting Your School Biodiversity Trail

Step 1. Invite students to consider the following questions by completing a THINK PAIR SHARE routine (questions also available on the Student Worksheet):

- What is the purpose of our school biodiversity trail?
- What do you hope users of the trail might get out of their visit to your trail? What messages do you hope they take away with them?
- How can we incorporate our ideas about citizen science into our trail and the information we provide about our trail?
- How can we incorporate information about the ClimateWatch app into our trail and the information we provide about our trail?
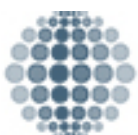
THINK PAIR SHARE

THINK PAIR SHARE IS A COLLABORATIVE LEARNING STRATEGY IN WHICH STUDENTS WORK TOGETHER TO SOLVE A PROBLEM OR ANSWER A QUESTION.

THINK – STUDENTS INDEPENDENTLY THINK ABOUT AN ISSUE OR QUESTION AND RECORD THEIR THOUGHTS.
PAIR – STUDENTS WORK IN PAIRS TO DISCUSS THEIR IDEAS AND RECORD NEW THOUGHTS.
SHARE – STUDENTS SHARE THEIR THOUGHTS WITH THE WHOLE GROUP OR WITH OTHER PAIRS TO REACH CONSENSUS.

Record student responses so that they can be accessed later.

Step 2. Now, invite the class to work together to suggest responses to the following question:

- What physical material and information would a visitor to our school biodiversity trail need to participate in citizen science, using the ClimateWatch app?

Write student responses on the board, ensuring that they include:

- Directions to the trail – *You may need a large-scale map showing the site of the trail.*
- A map of the trail – *You will need to ensure your map shows the start and end points of the trail, and includes cartographic conventions (you should be able to use the map you created earlier).*
- Field guides – *You will need the field guides you prepared earlier.*
- Recording sheet to record observations – *What information*
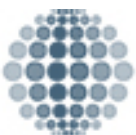
would you like users to record? E.g. date, season, weather, time of day etc. Consider checking what Earthwatch have used in their ClimateWatch Trails - have they included information you wouldn't want to include? Or would you include further information?

- Information about why the trail has been established – *You should let users know why this trail has been established and how the data collected will be used.*
- The name of the trail – *Can you think of a name or can you name the trail after you school?*
- Pen/pencil
- Instructions on how to download and use the ClimateWatch app.
- Smartphone or Camera (optional)

TIP: YOU CAN USE THE POINTS ABOVE (AND ANY OTHERS YOU CREATE) AS A CHECKLIST TO ENSURE STUDENTS HAVE INCLUDED ALL THE INFORMATION THAT VISITORS TO YOUR TRAIL WOULD NEED.

Some other points to think about when creating your materials for Package 1 include:

- What age groups would your trail be suited to? Could you make material that would be suitable for both young children through to adults?
- What might be the best way to communicate our ideas about these points to citizen scientists using the trail? Through written, visual or audio content? Justify your ideas. You could consider creating a video that describes the purpose of your trail and what the data aims to collect, as well as any other information that you think might be useful (e.g. Albury Botanic Gardens ClimateWatch Trail)
- Who will you invite to use your trail? Will the use of trail and recording of data be open only to citizen scientists within your school community? Or will you also invite the wider community

to join in? If so, how will these people get their observations to you?

GEOGRAPHY EXTENSION: IN THE INFORMATION YOU PROVIDE TO USERS OF THE TRAIL, YOU COULD ALSO CONSIDER INCLUDING A SURVEY OF THE USERS IN ORDER TO DETERMINE HOW THEY EXPERIENCE THE ENVIRONMENTAL QUALITY OF THE TRAIL SITE AND HOW ENVIRONMENTAL QUALITY OF SUCH SITES AFFECTS THE LIVEABILITY OF YOUR LOCAL AREA. YOU COULD INCLUDE SURVEY QUESTIONS IN PACKAGE I THAT COULD ALSO BE ANALYSED BY FUTURE STUDENTS.

Part C: Information for Future Students Using Your School Biodiversity Trail Data

Step 1. Now, invite students consider the following question:

- What would a future student analysing your data need to correctly use your submitted data?

Invite your class to suggest answers. Be sure to write student responses on the board, ensuring that they include:

- Information about why the trail was established – *In particular, you will need to explain what things you are looking for in the data, such as the dates of flowering plants becoming earlier, or the earlier than expected appearance of certain animals earlier in a season. You should also include any relevant information raised during the THINK PAIR SHARE routine in Part B.*
- Directions to the trail – *You may need a large-scale map showing the site of the trail.*
- A map of the trail – *You will need to ensure your map shows the start and end points of the trail, and includes cartographic conventions (you should be able to use the map you created earlier).*

- Photos of the site and trail in its current condition – *These could be used to assess environmental improvement or degradation over a period of time.*
- Field guides – *You will need the field guides you prepared earlier.*
- A copy of the recording sheet with information about why you wanted to collect specific information – *Why did you include dates, or seasons, or weather, or time of day etc.?*
- Templates for graphs and/or charts that can be used to analyse the data – *What would be the best way to display the data collect? Can you create a template for the graphs or charts you think would work best and instructions and justification for their use.*
- Any other information that is relevant to your school biodiversity trail – *This may include information about how it was created, any challenges you had in creating the trail, other organisations that are involved in the trail site (such as through management plans etc.), or details about extending the trail to becoming an official* [ClimateWatch Trail](#)*.*
- Suggestions on how the data collected could be shared or used by the school or community – *This could include ideas for engaging the community in action for climate change or biodiversity conservation.*

Explain to students that they will now work in their previously established groups to ensure that all this information is compiled in an information package that can be shared with future students completing a biodiversity survey of their school biodiversity trail. You may choose to allow your class to create their packages online, using resources such as [Sway](#), [Wix](#) or [Google Sites](#).

Encourage groups to divide this work up. If needed, you could work with groups to assign students particular tasks, or invite them to nominate themselves for the tasks they are most interested in.

Extension – Encourage your class to create immersive tours of their walks using virtual reality software like [Aurasma](#) and [Metaverse](#).
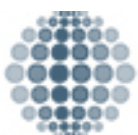
Alternatively online QR code generators can be used to create virtual tours of the site that show key aspects of their information packages.

Part D: Testing the Packages

Step 1. In the next part of the lesson, students will be heading outdoors to use the ClimateWatch app in the school yard. Invite students to bring their information packages, or devices capable of accessing their online packages, and a notebook and pen/pencil.

Hot tip: Students and teachers wishing to repeat this activity over subsequent years are encouraged to contact the ClimateWatch Program Manager to arrange to have their school added to ClimateWatch as an organisation and add class groups each year.

In preparation for this outdoor element, engage your class in a discussion about the concept of 'treading lightly'. Treading lightly means that you try your best to leave a natural environment in the same condition as you found it. It can even mean leaving it in better condition: take a rubbish bag with you and collect any rubbish you find to dispose of appropriately (e.g. landfill or recycling).

Following this, review your outdoor learning safety procedure. For example, you could adapt the following to the site you are visiting:

SUGGESTED SAFETY PROCEDURES FOR OUTDOOR LEARNING

* SHOW STUDENTS PICTURES OF POTENTIALLY DANGEROUS ANIMALS AND PLANTS.
* IDENTIFY THE PRESENT SEASON AND WHAT RISKS ARE ASSOCIATED WITH THIS SEASON.
* STAY CLOSE TO THE TEACHER (E.G. WITHIN EYE SIGHT).
* WORK IN PAIRS OR SMALL GROUPS.
* STICK TO THE TRACK AND LISTEN TO WARNINGS ABOUT OVERHANGING BRANCHES, SLIPPERY PARTS OF THE TRACK ETC.
* BE CAREFUL WHAT YOU PICK UP AND WHERE YOU PUT YOUR HANDS (I.E. NEVER PUT YOUR HANDS ANYWHERE YOU HAVEN'T CHECKED WITH YOUR EYES).
* WEAR STURDY BOOTS OR SHOES, AND ALWAYS WEAR A HAT AND SUNSCREEN.

Step 2. Invite students to imagine that they have never visited their trail before, and then conduct a biodiversity survey using Package 1.

They should:

- Use the map to find the trail
- Make observations using the field guides they created
- Record their observations using the recording sheets they created

In addition, they should make notes about what aspects of the trail and the information they have created are successful and what aspects need to be amended or improved.

Step 3. With the data they have collected, students should add this information to the data analysis materials they created in in Package 2, such as charts or graphs etc. Again, they should make notes about what aspects of the trail and the information they have created are successful and what aspects need to be amended or improved.

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Step 4. Allow students time to amend or improve any aspects from either package that need changing.

Step 5. Finally, invite students to participate in a class discussion around the following points:

- After 10 years of observations, what information do you think the biodiversity along your trail might reveal?
- What patterns do you think the data might show and why?
- How do you think this data might be used to help our understanding of climate change and biodiversity?
- How does your trail compare to a [ClimateWatch Trail](#)? What are the similarities and differences?

REMEMBER TO NOMINATE A STUDENT TO ENTER THE SPECIES INFORMATION THEY HAVE COLLECTED ONTO THE CLIMATEWATCH APP. ENSURE THAT ONLY ONE STUDENT RECORDS THEIR DATA TO REDUCE THE RISK OF ENTERING MULTIPLE OBSERVATIONS OF THE SAME INDIVIDUAL PLANT OR ANIMAL SPECIES.

Reflection

Invite students to work independently to answer the following questions (also available on the Student Worksheet):

1. What do you think are the strengths of the materials you created for your school biodiversity trail?
2. What might be the weaknesses? Have you included information/materials to help mitigate these weaknesses? Explain your answers.
3. What opportunities do you think there might be to improve or extend your trail?
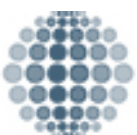
Teacher Reflection

TAKE THIS OPPORTUNITY TO REFLECT ON YOUR OWN TEACHING

* WHAT DID YOU LEARN ABOUT YOUR TEACHING TODAY?
* WHAT WORKED WELL?
* WHAT DIDN'T WORK SO WELL?
* WHAT WOULD YOU SHARE?
* WHERE TO NEXT?
* HOW ARE YOU GOING TO GET THERE?

Note: Cool Australia and Earthwatch have also partnered to create citizen science units of work for maths and science. To further enhance students' learning, consider teaming up with teachers in these complementary faculties to run a cross-curricular project on phenology and citizen science.