



Citizen Science – School Biodiversity Trail Lesson 1 – Years 7 & 8

Teacher Preparation

Learning intentions:

- Students know how citizen science adds to our understanding of the world.
- Students understand citizen science's relationship with communities.

Success criteria: Students can...

- ... engage with citizen science projects.
- ... investigate Earthwatch's work and confidently engage with their projects.
- ... observe and digitally record the location and behaviour of plant and animal species.

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 lesson is the first lesson in a unit about creating a school biodiversity trail. The full unit of lessons can be found here: [ClimateWatch: 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 the [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
- This lesson requires your students to go out into your schoolyard and begin recording species using the ClimateWatch app. We recommend that prior to this lesson, you download the app and scope the area you will be conducting this lesson in. Take 10-15 minutes to search for species featured in the app. If you are finding very few species, you can arrange for this lesson to be conducted as an excursion outside of school grounds. Areas like local parks are great places to find a range of species.



- Repeated monitoring at the same trail at different times of the year can demonstrate environmental change and reinforce concepts of phenology and climate change. Schools can use this lesson across multiple years and multiple classes to see what changes are happening in their local area. In addition to contributing to real-world science, the long-term data that can be generated from repeated ClimateWatch trail activities could also be used across other subjects such as geography and maths.

Teaching Sequence

10 minutes - Part A: Activating Prior Knowledge

15 minutes - Part B: What Does Citizen Science Look Like?

15 minutes - Part C: What is ClimateWatch?

15 minutes - Part D: Using the ClimateWatch App

5 minutes - Reflection

Work through this resource material in the following sequence:

Part A: Activating Prior Knowledge

Step 1. Invite students to team up with a classmate and respond to the following question:

- What do you think citizen science is?

After a minute of discussion, invite volunteers to share their responses with the class. Through your discussion lead students to the idea that citizen science can be described as scientific work that is undertaken by the general public. This work is overseen by professional scientists who devise the work, collaborate with the public and provide guidance.

Step 2. The class will now participate in a thinking hats activity to expand their understanding of citizen science. In particular, they will critically assess the advantages and disadvantages of citizen science,



noting along the way that the benefits outweigh the costs.. To begin this activity, create a blank 'Citizen Science' pros and cons list on the whiteboard. Explain to the class that they will be populating this list, with the pros and cons of citizen science from the perspective of; 'a researcher', 'a community member' and 'an environmentalist'.

Step the class through the process of collectively taking on the roles, one by one, questioning each party's interest in citizen science as they flesh out answers. Once the activity is complete, tally up the pros and cons. It may be worth sharing that Earthwatch have found that, when citizen science is done correctly, the benefits outweigh the disadvantages.

Step 3. Invite pairs to discuss the statement:

- Citizen science is only about science.

After a minute of discussion, invite students to share their responses with the class. Explain to students that citizen science is a broad term that has been used to describe projects as varied as transcribing ancient Egyptian parchments (e.g. [Ancient Lives](#)), to plant and animal surveys (e.g. [Wildlife Spotter](#) or [Aussie Backyard Bird Count](#)) to mapping changing urban demographics (e.g. [Urban Sensing](#)).

Part B: What Does Citizen Science Look Like?

Step 1. Still working in their pairs, invite students to use their devices to investigate one of the following citizen science projects (available in the Student Worksheet):

- Ancient Lives - <https://www.ancientlives.org>
- Aussie Backyard Bird Count - <https://aussiebirdcount.org.au/>
- Feral Scan - <https://www.feralscan.org.au/>
- Questa Game - <https://questagame.com/>
- Solar Stormwatch II
- <https://www.zooniverse.org/projects/shannon-/solar-stormwatch-ii>



- Roll the Credits
 - <https://www.zooniverse.org/projects/sroosa/roll-the-credits>
- Womsat - <https://womsat.org.au/womsat/default.aspx>





Step 2. Allow students five minutes to investigate one of the science projects using the questions below to guide them (available on the Student Worksheet):

- What is the aim of this project?
- What study area does this project relate to (e.g. biology, geography, etc.)?
- What are the roles/jobs of the citizen scientists involved project?
- How does this project use technology? For example, websites, digital cameras or apps.

Invite groups to briefly report their findings back to the class.

Step 3. Explain to students that they will be investigating an Australian citizen science project that analyses the relationship between climate change and biodiversity. To understand this relationship both science and geography skills are needed.

Part C: What is ClimateWatch?

Step 1. Invite student to form pairs, and invite them to investigate the [ClimateWatch website](#) and [app](#). Invite students to discuss and answer the following questions in their own words (also available on the Student Worksheet):

- What is ClimateWatch? *Suggested answers could include the following: ClimateWatch is a citizen science program created by Earthwatch that is a leader in collecting phenology data on a national scale. Changes in Australia's rainfall and temperature driven by climate change will result in our plants and animals altering where they live, feed and their phenology (flowering, fruiting, breeding, etc). Through ClimateWatch, users can record the location and behaviour for over 105 marine and terrestrial species through the ClimateWatch website and app. Anybody can participate in ClimateWatch anywhere in Australia, anytime. The ClimateWatch citizen science program engages people*





across Australia in the collection of scientific data that will help shape the country's scientific response to climate change.

ClimateWatch is a program run by EarthWatch Australia.

EarthWatch is an environmental charity that engages professional and non-professional scientists (citizens) in research and projects aimed at protecting and preserving biodiversity promoting the understanding and actions necessary for a sustainable environment.

- *What is the purpose of the ClimateWatch app? Why has it been created? Suggested answer: The ClimateWatch mobile app was created to make it easier for scientists and non-scientists (citizens) to contribute their observations of plants and animals to the ClimateWatch database from anywhere.*
- *What is a ClimateWatch Trail? Suggested answer: A ClimateWatch Trail is a set path that citizen scientists can visit to observe biodiversity and record sightings. Users walk the Trail and submit what they see to ClimateWatch via the ClimateWatch mobile app or website. ClimateWatch will then work with scientists to analyse the data and look for phenological changes.*
- *Who can use a ClimateWatch Trail? Suggested answer: Anyone who has a ClimateWatch Trail near them can use the trail. ClimateWatch sightings can be submitted from anywhere in Australia, not just trails, however ClimateWatch trails provides an opportunity to monitor the same area and its species on a regular basis, which is very beneficial for building up the data needed to understand species responses to environmental change.*
- *Where can you find ClimateWatch Trails? Are there any near your school? Answers will vary but the best place to start is with the [ClimateWatch Trails](#) webpage.*

Differentiated questions:

- Which ClimateWatch Trail activities or actions relate to Geography skills or knowledge?
Suggested answer: Collecting data and recording data from





primary sources. Collecting the geolocation of species; understanding how they are distributed on a local and national scale. Sightings can be assessed against environmental drivers (temperature, rainfall, etc.) to understand how particular species are affected by these changes.

- Which ClimateWatch Trail activities or actions relate to Science skills or knowledge?

Suggested answer: Species identification, observation (identification of seasonal behaviours), collecting and recording data.

Once complete, invite students to find another pair and, in their new group of four, share their answers.

Part D: Using the ClimateWatch App

Hot tips:

- If there is a ClimateWatch Trail near to you, consider organising a visit to this site with the class. This has added benefits of utilising existing [ClimateWatch trail resources](#). During this excursion your class can use the ClimateWatch app, take photos and evaluate the trail.
- To use the ClimateWatch app each device will need to have use a registered log in. You can register one login for the whole class to use, or have each student register their own account to use on their devices, prior to the lesson. Alternatively you could contact ClimateWatch to create a class group that can be used over subsequent years: climatewatch@earthwatch.org.au

Step 1. Explain to your class that they will be heading to the school yard to use the ClimateWatch app. To do this they need to know how to search and enter species into the app. Invite students to open the app on their devices and register. Teachers should talk them through this process:

- Log in to the app using the email and password they registered





with or the one you have created for the class.

- Read the ClimateWatch information page and then press 'tap to begin'.
- Search species by pressing the 'categories' icon and scroll down to the species you are after
- Record a sighting by pressing 'Record', adding to all fields and pressing 'Submit Record' when finished

Step 2. Adapt the safety procedure below for any hazards in your school yard and review it with students:

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 EYESIGHT).
- * 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.

Invite students to collect their worksheet and the internet enabled devices, then lead them to the school yard.

Step 3. Once you have arrived, break the class into two groups. Name one group 'animals' and the other 'plants'. Explain that each group will have 15 minutes to identify some of the species listed on the ClimateWatch app, recording this information in their workbooks.

Students could also enter their sightings onto the ClimateWatch app. Do



this by nominating one student per group to enter their data into the app. This will avoid groups making multiple entries for a single siting. The nominated student should discuss what is entered into the app with their group, gaining a general consensus before recording any observation.

Reassure your class that entering data into the app is not a competition, and if they do not find a great deal of species this is fine. The most important thing is to consider the process of collecting data and, if you make a siting, making sure it is documented correctly.

Extension - You may wish to involve your class in a discussion around the importance of collecting accurate data and how citizen science data is cleaned:

Accuracy of data is very important because the data collected using the ClimateWatch app will be used to predict species distribution and changes in seasonal behaviour, as well as aid in effective conservation management plans.

ClimateWatch has a board of trained scientists come together multiple times a year, to review the app's data. They work together to verify accurate sitings and reject false sitings. This process is called cleaning the data, and can be a very lengthy process.

Step 4. Once groups have had time to find several species, gather students together in a discussion circle and invite them to share what they found. Then, engage students in a discussion around the following questions:

- Which of the species you found were new to you and which ones had you seen before?
- What information did the app provide that helped you to identify species?
- Was there information on the app that you didn't find useful? Why do you think this information was included?

Have your students collect their equipment and return to class.

Step 5. Once you have returned to your classroom reiterate the value of having young people engaging with citizen science. Explain to students that throughout this unit they will be challenged to create a school biodiversity trail inspired by Earthwatch's ClimateWatch trails.

Project the [ClimateWatch trail](#) page or have students open it on their devices, looking for a trail near you. Explain that your class' school biodiversity trail will be a track in their local area that others can visit and record ClimateWatch in. If people engage with their school biodiversity trail we will have a better understanding of how our local biodiversity is being affected by climate change.

Note: There is the potential for students and their teachers to create their own official ClimateWatch Trails that can be that can be featured on the ClimateWatch website and provide long-term monitoring. However, this requires resources (such as funding and community involvement) beyond the scope of this unit. Further information on how to create a ClimateWatch trail can be found at <http://www.climatewatch.org.au/trails>

Hot tip: If your school yard is lacking in biodiversity, consider arranging this part of the lesson to be a field trip to a local park or bushland.

Reflection

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

- What do you think is the most interesting thing about the citizen science projects you looked at?
- What do you think are the benefits of citizen science projects?
- What do you think is the most interesting thing about the ClimateWatch app and why?
- What questions do you still have about the things you looked at in this lesson?



Differentiation:

- What are some other ways citizen science could be used in geography-based projects? Suggest two options.
- What are some other ways citizen science could be used in science-based projects? Suggest two options.

Take It Further

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. Alternatively, you could check on the data on the ClimateWatch website (by filtering by region [State/Territory]) collected and recorded during previous years' observations, considering the following questions:

- Have numbers of observed species declined or increased?
- What was the highest recorded species?
- Were any phenophases (the observable, annual phases of a plant or animal's life cycle such as flowering, or breeding) observed and if so, are they occurring earlier or later than previous years?
- What might be the reasons for earlier or later phenological activity?
- What might be the reasons for increases or decreases in species observations?
- How might we improve school habitats for any indigenous species that are declining?

Note: It takes many years to discern trends associated with a long-term issue (such as climate change).





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.

