



Climate Watch Toolkit

Be part of the solution

version 1 | January 2019



ClimateWatch
An initiative of Earthwatch Institute

Contents

Introduction	3
The Issue	4
How to	5
A. How to register with ClimateWatch	5
B. How to submit a sighting	6
C. How to be a good ClimateWatcher	7
D. How to create a ClimateWatch Trail	8
Resources and tools	9
Frequently Asked Questions	10
Case Studies	11
Case Study: ClimateWatch for corporate groups	11
Case Study: ClimateWatch at Botanic Gardens	12
Case Study: ClimateWatch for educational groups	13
Sustainable living	15
Feedback & Comments	17

Introduction

This ClimateWatch Toolkit is an adaptive and evolving resource that represents content to engage citizen scientists, educators, land-managers and businesses in undertaking ClimateWatch biodiversity and phenology monitoring into their activities. The ClimateWatch Toolkit will grow as feedback, knowledge and new information becomes available. To share information with us, contact climatch@earthwatch.org.au

ClimateWatch is an initiative of the [Earthwatch Institute](#). The program was first developed in 2009, with the support of the Bureau of Meteorology and University of Melbourne with the aim of building an Australian-wide network to monitor phenology - the seasonal changes in nature.

By engaging citizen scientists (the general public) in observing, recording and collecting data on Australian flora and fauna, ClimateWatch helps build an understanding of the implications of climate change. It is the largest citizen science phenology project of its kind in the Southern Hemisphere and is currently supported by the Commonwealth Inspiring Australia Science Engagement Program, the Helen Macpherson Smith Trust and the Victoria Department of Education and Training. Previous partners and sponsors are listed [here](#).



Not only are we paving the way for important citizen science phenology research but we are also doing our part to assist in achieving the 2015 United Nations 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs).



4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.



13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.



11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage.



15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

The Issue

Climate change is a hot topic these days (quite literally) and it is well understood that as a result we will be facing an increase in global average temperatures and extreme events. A rise of 2 degree on average has been predicted; however, this is not simply the difference between a 20 degree day and a 22 degree day, but average temperatures across the world over an entire year.

Most places on the planet will get far warmer, some will get drier and others will be much wetter. Our polar ice caps will continue to melt and our sea levels will rise. Extreme weather events are one way we are already experiencing climate change. Extreme events will become more intense and occur more frequently in the future.

The burning of fossil fuels such as coal for electricity and oil fuel for transport, deforestation for farming or urbanisation, and agriculture are some of the culprits for our rising greenhouse levels (Fig 1).

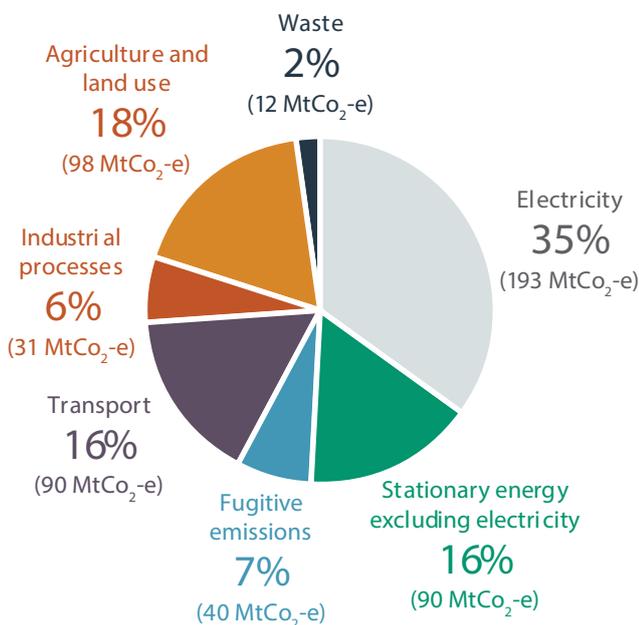


Figure 1. Contributors of greenhouse gas (CO₂) in Australia.

Source: Australian Government, Australia's National Inventory Report 2012, 2014.

Note: Figures are expressed using Kyoto Protocol accounting rules in terms of millions of tonnes of carbon dioxide equivalents (MtCO₂-e), using the global warming potentials published in the Intergovernmental Panel on Climate Change's Second Assessment Report.

Over the past 100 years, the average surface temperature in Australia has risen by 0.9 C - 1.1 C and we are already seeing impacts in nature. Climate change is affecting rainfall and temperature across the country and as a result, affecting established flowering times, breeding cycles and migration movements and other phenological (seasonal) changes. With this rapid change in climate, over a million species (including us) will have to adapt quickly or face extinction.

So what can we do to help?

ClimateWatch was developed to understand the effects climate change is having on our earth's natural processes. Created as a citizen science project, it allows every Australian to be involved in collecting and recording data that will increase our understanding of climate change impacts.

Essentially, ClimateWatch monitors phenology... [phenolo-what you ask?](#)

Phenology is the study of periodic plant and animal life cycle events and how these are influenced by seasonal and interannual variations in climate. Examples include bird nesting, insect hatching, plant flowering and fruit ripening. Many studies have already provided insight into the relationship between climate variables, such as temperature and rainfall, to the timing of these phenophases. Monitoring phenology is important as changes can impact entire biological communities, our food sources and our health. Unfortunately few significant datasets have been collected and researched in Australia and the Southern Hemisphere.

By becoming a ClimateWatch citizen scientist and monitoring your local environment, you will be filling in the gaps of information that are largely lacking in our region of the world and are vital for informing climate change management strategies and solutions.



How to

A. How to register with ClimateWatch

Four quick and easy steps to get involved:

1. Register online with [this link](#) or skip to step 2 and sign up with the app.
2. Download our iPhone or Android app through your app store and log in or sign up with your email account.
3. Start observing and recording.
4. Stay connected to the ClimateWatch website and our social media to keep up-to-date with news and added species!



B. How to submit a sighting



SMART PHONE

If you are recording through your app on your phone, click the camera icon to take a clear and close photo of the species. The app will ask you to choose the appropriate

species, fill in the required information, and bam! You've just contributed to climate change science and it is that easy. You can click on the different flora and fauna for an in-depth description and photos to learn more about your sightings. This information is also in greater detail on each of the species pages on the ClimateWatch website. Familiarise yourself with one to two species at first to help build your confidence.



WEBSITE

If you are recording through the website, search for the species in either the side search box or the drop down species tag. You can also enter your species via a trail page,

if you know were on a specific ClimateWatch trail. Once you have identified the correct species, click 'Record Your Sighting' on the left hand side and fill in required information. Don't forget to upload your clear photo and pop in the location of the sighting. You will be impressing your friends with your new knowledge on local flora and fauna!

Tip: If you are in doubt over species identification, or if you are unable to take a photo of the species (eg. you identified it by its call, or it moved away too quickly) take a photo of the habitat and add additional comments to your sighting. All data collected is validated manually by Earthwatch and contributes to the [Atlas of Living Australia](#), a public national biodiversity database.



C. How to be a good ClimateWatcher

We can all be citizen scientists and we can all make a difference! There are a number of things that we look for when checking your observations. Here are a few tips on how to be a good ClimateWatcher.

FAMILIARISE YOURSELF WITH CLIMATEWATCH SPECIES

Some species are only located in particular regions of Australia. Make sure you have identified the right species by using the field guides available online, and the info on the ClimateWatch app. Other mobile field guides available from your local museum will also help.

ClimateWatch is interested in the behaviour of a species as well as its location. Watch for species that are doing something particularly different to what you would normally see. For example, looking for swooping or nesting behaviour in the Australian magpie (*Cracticus tibicen*), which only happens during breeding season.

Alternatively if you have a ClimateWatch species that you see all the time (like in your backyard), record an observation every couple of weeks, to get an idea of changes throughout the year.

SUBMIT PHOTOS TO HELP VALIDATE YOUR SIGHTING

Photos are required on all app sightings to assist us in validating data for use in scientific research. If uploading sightings via the website, make sure it is your own photo of that sighting, not a friend's or one from the Internet. ClimateWatch is only interested in wild animals, so please do not submit any sightings of captive animals.

The perfect ClimateWatch photo is a close up of the species. For trees, this means a picture of the leaves or seeds, so our species experts can verify what you've seen. Due to data hosting limitations, video recordings and multiple photos are not able to be submitted to a sighting at this stage in time. You may submit multiple sightings of the same specimen if you wish to add a different photo. For animals, try to zoom in or get close to the species before taking the shot. Make sure you stay safe though!

UNSURE ABOUT YOUR SIGHTING?

If you are in doubt over the identification of your species, or if you are unable to take a photo of the species (eg. you identified it by its call, or it moved away too quickly) take a photo of the habitat and add additional comments to your sighting.

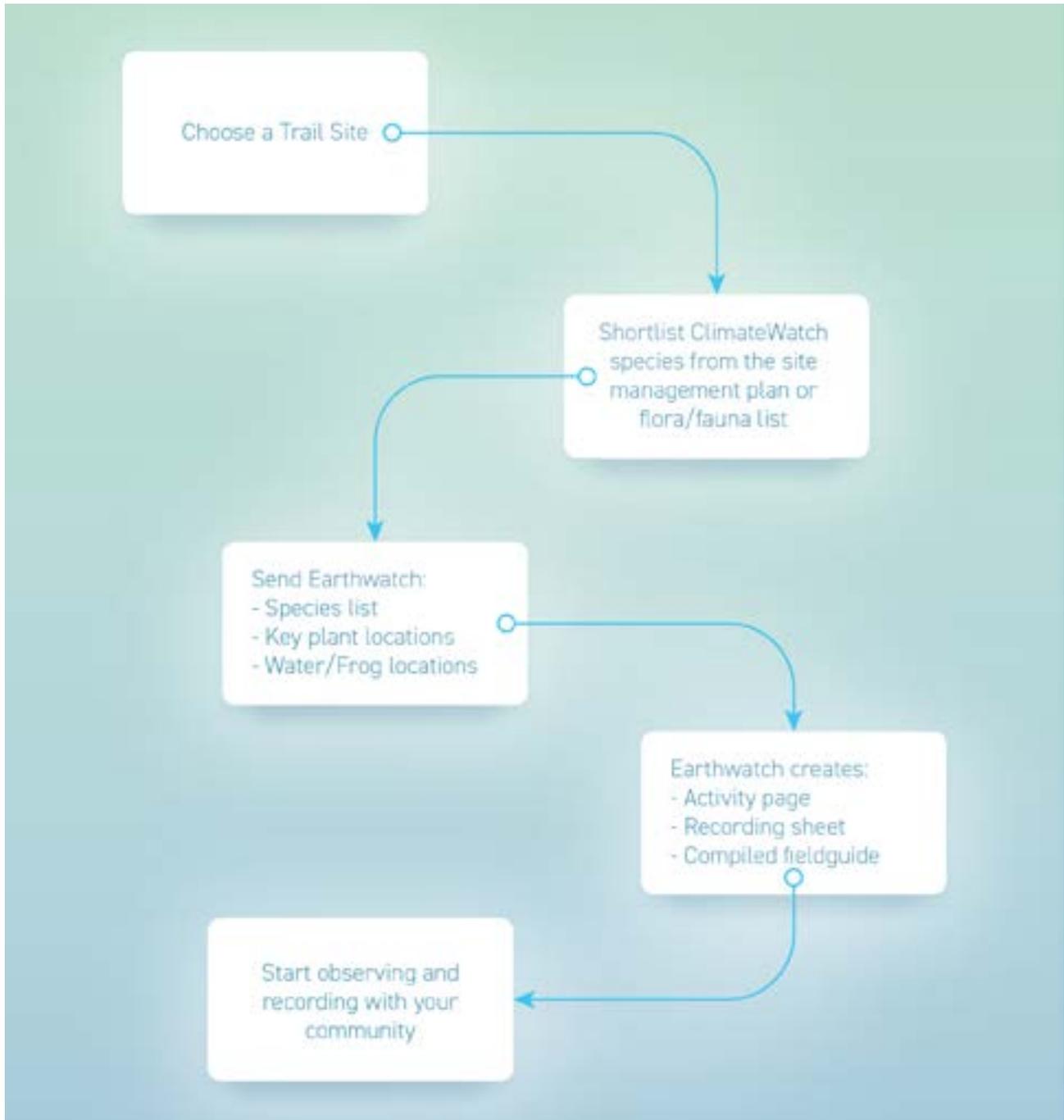
Check your Sightings list regularly to make sure your sightings are uploaded correctly. Edit your sightings if you think you've made a mistake. If you notice any issues, contact climatch@earthwatch.org.au

D. How to create a ClimateWatch Trail

Want to take things to the next level? Create a ClimateWatch trail to involve your local community, business or school in recording at a location that is important to you.

Head to our website [here](#) for more information on creating a trail, including the associated costs and information you need to provide us.

Submit your queries or completed documents to climatewatch@earthwatch.org.au



Resources and tools

Want help on becoming an expert on ClimateWatch species identification?

[Australian bugs](#)

[Atlas of living Australia](#)

[Field Guide app to Victorian Fauna](#)

[FloraBase](#)

[Museums Victoria](#)

[PlantNet](#)

[World Register Of Marine Species \(WORMS\)](#)

More citizen science projects

[Australian Citizen Science Association-Project Finder](#)

[Citizen science app helping to plot climate change](#)

[Citizen science projects across Australia](#)

[Reef Check Australia](#)

[Reef Life Survey](#)

[Red Map](#)

[Tangaroa Blue Foundation](#)

[Underwater Volunteers NSW](#)

[Urban Microclimate Project](#)

Get to know Earthwatch Institute

[Earthwatch Institute website](#)

Grow your knowledge on Phenology

[Early birds: how climate change is shifting time for animals and plants](#)

[Phenology and climate – early Australian botanical records](#)

[Phenology- nature.com](#)

Need to know all the Climate change lingo?

[Climate Change in Australia \(CSIRO\)](#)

[Climate Council resources](#)

[NCCARF - resources on the impacts of climate change and how we can help nature adapt](#)

[The Intergovernmental Panel on Climate Change \(IPCC\)](#)

Frequently Asked Questions

Head to the FAQ section on [our website](#) to see if your question has already been answered. If it hasn't, please send an email to climatewatch@earthwatch.org.au

Case Studies

Case Study: ClimateWatch for corporate groups

For more than two decades, EarthWatch has worked in partnership with the corporate sector all over the world. ClimateWatch offers businesses employee engagement and professional development, whilst supporting environmental research into Australia's changing climate.

Join companies like AMP, Jetstar and GSA architects in Earthwatch's 'ClimateWatch: Scientist for a Day' program. Our 'Scientist for a Day' programs are corporate team-building and learning day's run for businesses and non-for-profits around climate change and phenology.

Scientist for a Day with AMP

- Employees at AMP were given the opportunity to participate in a guided walking tour of the Sydney Botanic Gardens, accompanied by EarthWatch scientists and field staff in the 'Scientist for a Day' program.
- The team was introduced to climate change and phenology, and received training on species identification and use of the ClimateWatch app.
- This wasn't just an ordinary day in the office! Through their recorded observations, AMP staff actively contributed to ClimateWatch's species database to help scientists understand the effect climate change is having on Australian plants and animals.

Become a partner/donate to ClimateWatch

There are a number of benefits to partnering with ClimateWatch, including:

- Access to employee engagement and professional development activities such as 'Scientist for a Day' (see above), expeditions and sustainability leadership programs
- Networking opportunities with other companies, non-governmental organisations, scientists, and environmental stakeholders
- Direct support of scientific research focusing on understanding, predicting and mitigating the effects of climate change on Australia's biodiversity



Testimonials

"The staff were excellent on the day, very friendly, helpful with the right mix of education. It was a fun morning but also a great environment to learn more about local species and environmental impacts"

GSA architects, Scientist for a Day participant

In a recent survey, 94% of corporate employee participants said that they were satisfied with their 'ClimateWatch: Scientist for a Day' experience, and 90% said that it had increased their knowledge of the impact and causes of climate change.

Want to become one of our important partners or donors? Easy! Get in touch with ClimateWatch Program Manager at climatewatch@earthwatch.org.au or donate [here](#) to help fund Earthwatch's valuable scientific research in Australia.

Case Study: ClimateWatch at Botanic Gardens

Want to get started with monitoring and recording species data for ClimateWatch but don't know where to start?

We have established trails in many botanical gardens throughout some Australian capital cities, which make it easy for you to get started! Many of these gardens offer guided walks that you can follow and record your observations. You can easily record through our ClimateWatch app, or you can download and print off a field guide and recording sheet from our website and then manually enter your data later. Our established botanic garden trails give our scientists a consistent, seasonal and reliable source of species data collection over a significant period of time.

Walking a trail is an easy way to get outside and involve your friends, family, students or colleagues in discovering your local environment while contributing to important research. Trails can be explored for short or long walks, daily or weekly or monthly, it's up to you. Make sure you wear comfortable walking shoes, a hat and sunscreen, and have some water with you.

Australian National Botanic Garden (ANBG) - ClimateWatch trail

- With previous generous funding from Friends of the Gardens, the ClimateWatch trail at the ANBG provides signage for the ClimateWatch plants found around the Gardens, as well as two ClimateWatch information signs. Trained volunteers help record observations of species and engage with visitors to the Gardens to become citizen scientists.
- You can head to the ANBG trail page and download the appropriate field species guide, trail sightings and recording sheets to record your observations.

Testimonials

“It is another way that our visitors can engage with our collection of Australian native plants and contribute to valuable research in protecting our native plant species.”

ANBG General Manager, Peter Byron, 2010

You can find a list of all our trails [here](#). Click on the trail nearest you and download the appropriate recording tools.



Jacaranda leaves

Case Study: ClimateWatch for educational groups

ClimateWatch provides real-world learning opportunities for students, from data collection out in the field to data analysis and interpretation back in the classroom. By actually making science, not just reading about it, students are engaged and motivated to learn, and feel like they're making a difference by contributing to Australia's climate change response. Secondary, tertiary and other education institutions across the country have been integrating ClimateWatch into the curriculum, as demonstrated in the following case studies. It's easy to get involved, get out in nature and make a difference!

First-year biology unit at the University of Western Australia (UWA)

- As part of their course, first-year biology students at the UWA utilise ClimateWatch records on a chosen species to formulate a hypothesis as to why that species might show different phenophases over time. They are also required to submit at least 20 recordings of their own, made easy through the dedicated ClimateWatch trail on campus.
- Students learn the complete process of scientific research in a fun and engaging way, with research showing the majority planned to continue recording data for ClimateWatch after the project was finished. A large proportion (35 percent) also introduced the application to their friends, demonstrating the important role ClimateWatch has in environmental engagement.

You can read more about the success of using ClimateWatch for UWA's undergraduate courses [here](#).

Newhaven College ClimateWatch Trail

- Year 9 students at Newhaven College on Phillip Island were involved in developing a ClimateWatch Trail on their 82-acre school grounds. They also created an education program for younger year levels, demonstrating how to monitor and observe species.
- The trail is used as part of the science curriculum from Prep to Year 12, teaching students about climate change, phenology and biodiversity in an immersive and interactive way.
- "It fosters a sense of belonging to place, encourages observation of nature and empowers them to help collect data for further research on climate change. [Students] expressed high levels of personal growth [and] feelings of achievement..." Ann-Marie McLean, Secondary school teacher at Newhaven College.

If your school would like to lead the way in citizen science and create your own ClimateWatch trail please [read here](#) or get in contact with the ClimateWatch Program Manager at climatewatch@earthwatch.org.au

ClimateWatch in Parks program, Parks Victoria

- Partnering with local schools, community groups and Parks Victoria, Earthwatch is developing 13 new ClimateWatch trails across regional Victoria over 2018 – 2020.
- The ClimateWatch in Parks is a stewardship program helps connect regional students and community members to real-world citizen science, contribute local data to Australia's national phenology network and help increase scientific knowledge that will inform Parks Victoria's management and intervention strategies for species and ecosystems at risk.





If your school or organisation would like to find out more on becoming part of the ClimateWatch in Parks program you can head to our website [here](#) for information on areas where the program is currently available in regional Victoria. For more information, contact us: climatewatch@earthwatch.org.au

Free curriculum resources with Cool Australia

- Year levels 7-10 now have access to free climate change and citizen science lessons in the areas of mathematics, geography, and science, thanks to our partnership with Cool Australia.
- The lessons focus on phenology, climate change and citizen science and are all linked to the Australian Curriculum and syllabus, empowering school children to contribute to climate solutions!

You can access the free lessons and learn more [here](#).

Testimonials

“Using real data was both more interesting and intense than using fabricated data. It was really cool that the data was an accurate representation of the world, and thus had actual real world applications”

Uni student, Jess, describes using Climatewatch data for her year 11 Computational Science project

“Working with the Climatewatch data was an incredible opportunity for my students. To work on something real, make new discoveries, and do something that matters are an extraordinary source of motivation, and the kids could see the impact and true worth of the tech and data skills they were learning.”

Dr. Linda McIver- Director, Australian Data Science Education Institute

Sustainable living

Has using the ClimateWatch program got you inspired to do more for climate change? We've created a resource of how you can be more sustainable every day!

CLIMATEWATCH MONITORING

Continue monitoring with ClimateWatch at home, the botanical gardens, or with your family in your local area. Visit [ClimateWatch trails page](#) for information on the many different ClimateWatch trails across Australia, or visit our [Google Maps page](#) to view the ClimateWatch trails near you.



REDUCE CHEMICALS

Use environmentally friendly personal and household cleaning products and bathroom products, for example, distilled vinegar for cleaning or ocean-safe sun-blocks. The NSW Government has put together a Green Cleaning page and PDF [here](#).

COMMUNITY GROUPS

Volunteer your time with wildlife organisations, community gardens or conservation groups like LandCare. Or donate money to not-for-profits like EarthWatch, [get involved](#).

CHOOSE ALTERNATIVES TO CAR TRAVEL

Walk, cycle, public transport, or car-pool. Some extra tips to minimise your car's effect on the environment can be found [here](#).

ONLINE MEETINGS

Hold meetings and conferences with external offices through phone or internet, rather than flying interstate or overseas for meetings.

THE 7 R'S OF RECYCLING

Recycle, Refuse, Reduce, Reuse, Repair, Re-gift and Recover: [7 R's of recycling](#).

Be thoughtful when buying and use your dollar to tell companies what you want and don't want. Ditch single-use, disposable for reusable and repurpose items where possible. [This website](#) has some great ideas.



Search your local council's website to find out what can be recycled in your area. For example, soft plastics (chip packets, bread bags) can't be recycled by many councils, but they can be dropped off for recycling at some supermarkets. Find your nearest soft plastic drop-off point [here](#). For more recycling tips in VIC, visit [here](#).

COMPOSTING - EVEN IN APARTMENTS!

[Here's a handy link](#) where you can check your councils discount on compost bins, worm farms and bokashi bins. You can also donate your compost to your local community garden or connect with others via [www.sharewaste.com](#)

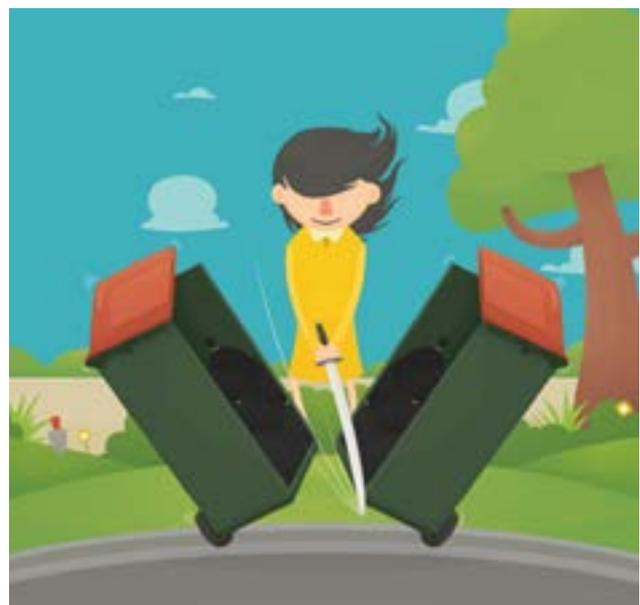


Image source: <https://compostrevolution.com.au>

BUY LESS MEAT AND DAIRY

In Australia, livestock accounts for 10% of total greenhouse emissions. Globally meat and dairy use up to 83 percent of the world's farmland and also uses a significant amount of land, water and food. Try opting for a diet with less meat and dairy products; you'll be helping the environment, feeling healthier and saving an animals life. The BBC created a food carbon foot print calculator the emission of your favourite foods, you can visit [here](#).

BUY SEASONALLY AND LOCALLY

You can reduce your carbon footprint by shopping at your local farmers market or growing your own fruit and veg. Reduce transport emissions, packaging and refrigeration, while also supporting local farmers and buying fresher produce. As of September 2018, it is now compulsory by law for food products to label where they are grown, produced, made or packed to help consumers make more informed food decisions.

BIODIVERSITY-FRIENDLY GARDEN

Build ecological resilience at home by planting native trees targeting woodland birds and important pollinators (eg. Bees and Flying-foxes), nest boxes, trees for cooling and shelter, water in summer. For more information head [here](#).

OFFSET YOUR CARBON

If there's no way for you to avoid that flight, Airlines and other companies offer carbon offsetting or carbon credits to the cost of tickets, donating to projects around the world that are designed to reduce greenhouse gas emissions. Find out how carbon offsets work [here](#).

TRY OUT WASTE-FREE SHOPPING

[Visit this website](#) that lists bulk refill stores around Melbourne and [here for Sydney](#). View a [waste fact sheet here](#).

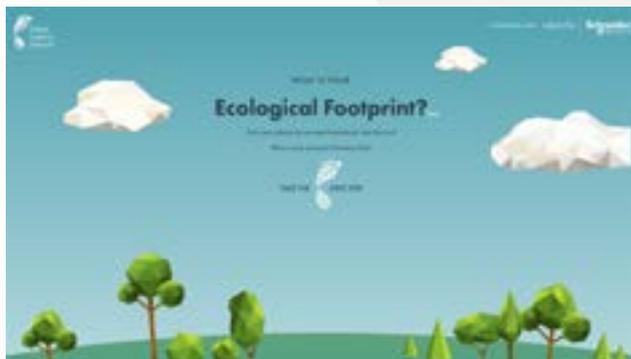


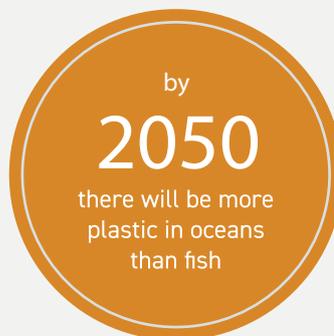
Image source: <http://www.footprintcalculator.org/>

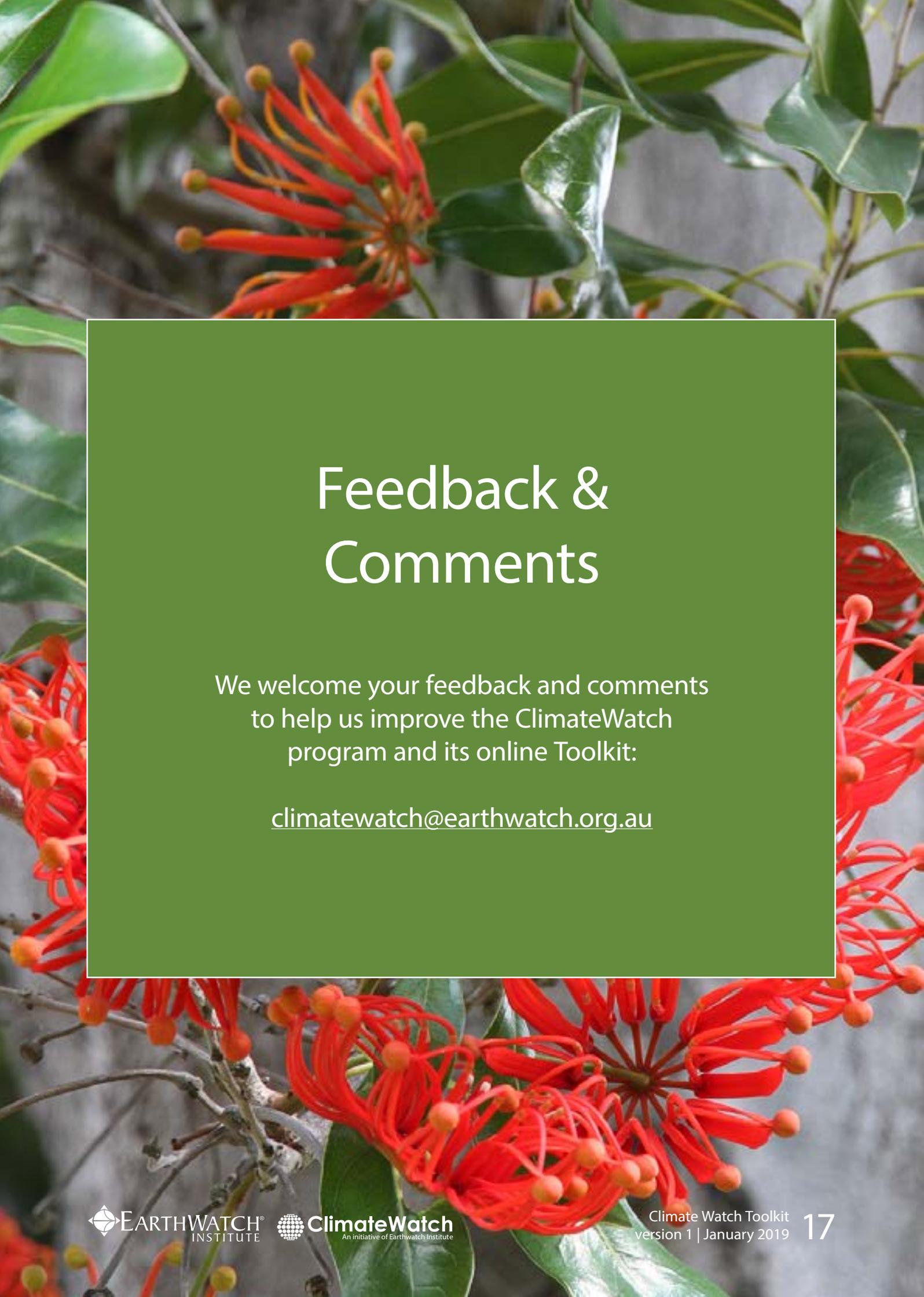
For some additional tools, check out [Greenfleet's reduce emissions page](#) for more detailed tips on how to reduce your life's emissions.

Calculate your ecological footprint with [footprint calculator](#) and see how many planets we would need if the whole world shared your lifestyle

Be informed and stay up-to-date with climate and sustainability news, make decisions that reflect the world you want to live in, vote smart and put energy into groups and organisations fighting for environmental change.

It all starts with you; 1 person can make a difference!





Feedback & Comments

We welcome your feedback and comments
to help us improve the ClimateWatch
program and its online Toolkit:

climatewatch@earthwatch.org.au