

*‘Education is not the filling of a bucket but the lighting of a fire.’*

(W.B.Yeats)

**Acknowledgements**

This educational resource was produced by The Climate Reality Project Australia (Climate Reality Australia) as part of a program funded by AusAID’s Australia Awards Fellowships. Climate Reality Australia is a program delivered by the Australian Conservation Foundation. Support and input from our Branch partners, The Climate Reality Project India (supported by The Climate Project Foundation India), and The Climate Reality Project Indonesia (supported by the National Council on Climate Change Indonesia), were essential to resource development.

The resource is designed to introduce young people to climate change. Whilst not an exhaustive educational resource, it is intended to raise the awareness of school-aged students about our changing climate, adaptation and mitigation practices and the need to reduce greenhouse gas emissions in schools and local communities.

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The materials in this educational resource have been developed by Angela Colliver from Angela Colliver Consulting Services Pty Ltd.

The Climate Reality Project would like to acknowledge and sincerely thank participants of the Climate Educators’ Skillshare in May 2013, and our education program reference group for offering comments on the drafts of materials in this educational resource.

Where experiments are involved, you are advised to carefully follow all instructions and heed all warnings. Experiments should be conducted only under adult supervision.

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Contents

[Primary Teacher How to guide 4](#_Toc364939199)

[About the approach 5](#_Toc364939200)

[Implementing the unit and activities in the classroom 6](#_Toc364939201)

[Using the unit 6](#_Toc364939202)

[Selecting activities 6](#_Toc364939203)

[Resourcing the unit 6](#_Toc364939204)

[Adapting the unit 7](#_Toc364939205)

[What about assessment? 7](#_Toc364939206)

[Assessment strategies 8](#_Toc364939207)

[Some questions and possible answers 8](#_Toc364939208)

[Unit 1 - Primary 9](#_Toc364939209)

[Teacher Notes 9](#_Toc364939210)

[Curriculum focus 10](#_Toc364939211)

[Discussing climate change – science facts 11](#_Toc364939212)

[Stage 1: Engage with the topic climate change 13](#_Toc364939213)

[Step 1.1 Getting started – a brainstorm, discussion 13](#_Toc364939214)

[Stage 2: Explore ideas relating to climate change 16](#_Toc364939215)

[Step 2.1 Exploring climate change 16](#_Toc364939216)

[Step 2.2 Picturing climate change – using a global perspective 18](#_Toc364939217)

[Step 2.3 Making connections 19](#_Toc364939218)

[Step 2.4 Research task 1: Consider the current situation at the school 21](#_Toc364939219)

[Stage 3: Explain how schools can reduce greenhouse gas emissions 23](#_Toc364939220)

[Step 3.1 Research task 2- Pathways to action 23](#_Toc364939221)

[Step 3.2 Survey your school 25](#_Toc364939222)

[Stage 4: Elaborate and work together for change 27](#_Toc364939223)

[Step 4.1 Plan a project for change 27](#_Toc364939224)

[Step 4.2 Make the changes 29](#_Toc364939225)

[Stage 5: Evaluating 31](#_Toc364939226)

[Step 5.1 Think back and evaluate 31](#_Toc364939227)

[References 32](#_Toc364939228)

[Websites (viewed July 2013) 32](#_Toc364939229)

[Resource pages 34](#_Toc364939230)

[Resource 1.1 34](#_Toc364939231)

[Resource 1.2 38](#_Toc364939232)

[Resource 1.3 39](#_Toc364939233)

[Resource 1.4 40](#_Toc364939234)

[Resource 1.5 42](#_Toc364939235)

[Resource 1.6 43](#_Toc364939236)

[Resource 1.7 45](#_Toc364939237)

[Resource 1.8 46](#_Toc364939238)

[Resource 1.9 47](#_Toc364939239)

[Resource 1.10 48](#_Toc364939240)

[Resource 1.11 49](#_Toc364939241)

[Resource 1.12 50](#_Toc364939242)

# Primary Teacher How to guide

This resource material aims to help teachers and students in primary schools explore some of the concepts of a changing climate and strategies to learn how your school can be part of the global solution to climate change.

The objectives of the Climate Change & Sustainability educational resources are to:

* Support Climate Reality Leaders in expanding climate change awareness by encouraging teachers to communicate climate change
* Provide resources which help build leadership skills amongst teachers and student in communicating climate change.
* Create a broader understanding of climate change education
* Develop education resources that can be used across the Asia-Pacific region that provide encouragement, information and practical teaching advice that will support efforts to tackle climate change
* Educate school students on ways to tackle climate change
* Demonstrate to students that everyone can play a part in reducing net greenhouse emissions and slowing down the rate of climate change
* Develop programs using an inquiry and sustainability action process in which students can make their own impact on greenhouse emissions. In particular by taking direct action measures to reduce energy and water use, minimise waste generation and enhance local biodiversity
* Assist school students to spread this message to their families and the broader community
* Develop in school communities, an integrated climate change education program that emphasises the relationship between individuals, communities, the environment and our climate.

These educational resources are an effort to provide practical support to teachers and students dealing with opportunities that can improve their journey towards sustainability.

It contains a unit of work with a variety of student activities selected as vehicles to help students:

* Investigate what climate change is
* Assess and measure the current sustainability situation at the school
* Investigate concepts and ideas relating to climate change, climate adaptation and sustainability
* Investigate what could change in the school and why
* Generate ideas and explore options for making a sustainability change
* Select ideas and take action
* Reflect and evaluate the success of the action for improving sustainability, adapting to climate change and reducing greenhouse gases at the school.

# About the approach

The approach used is the inquiry approach through five phases: Engage, Explore, Explain, Elaborate and Evaluate. The phases of the model are based on the 5Es instructional model (Bybee, 1997).This unit of work containing student activities assists students to raise questions, gather and process data, make conclusions and take action. These phases are:

* **Engage**: The ‘Engage ’phase begins with lessons that mentally engage students with an activity or question. It captures their interest, provides an opportunity for them to express what they know about the concept or skill being developed, and helps them to make connections between what they know and the new ideas.
* **Explore**: The ‘Explore’ phase includes activities in which they can explore the concept or skill. They grapple with the problem or phenomenon and describe it in their own words. This phase allows students to acquire a common set of experiences that they can use to help each other make sense of the new concept or skill.
* **Explain**: The ‘Explain’ phase enables students to develop explanations for the phenomenon they have experienced. The significant aspect of this phase is that explanation follows experience.
* **Elaborate**: The ‘Elaborate’ phase provides opportunities for students to apply what they have learned to new situations and so develop a deeper understanding of the concept or greater use of the skill. It is important for students to discuss and compare their ideas with each other during this phase.
* **Evaluate**: The ‘Evaluate’ phase provides an opportunity for students to review and reflect on their own learning and new understanding and skills. It is also when students provide evidence for changes to their understanding, beliefs and skills.

Teachers will find, as they examine this unit and its student activities that there are some learning areas which are more strongly represented than others. This is a consequence of the subject matter with which students are dealing. Naturally, sustainability is the dominant perspective, Geography and Science also features strongly in the unit as the topics deal with the planet’s condition, place and space and change. English and the arts, particularly visual arts are featured strongly throughout the activities.

Rich significant content is essential to good curriculum and a student driven exploration of climate change and actions we can take to be more sustainable is one of the significant sustainability and climate adaptation challenges a teacher can take up with his/her students.

The unit includes regular reminders to invite students to check and reflect on the way their understandings, attitudes and values are evolving. In addition to reflection on content, teachers are encouraged to question students about the process they are using to come to new understandings.

Deep understanding takes time – achieving it is a gradual process that evolves throughout the unit and is facilitated by reflection. This unit invites students to think beyond the data they gather and the texts they read and view – to step back from their investigations and do some big picture thinking for improved sustainability and reduced energy and/or water use, or improved waste avoidance/resource recovery and biodiversity plantings at the school. In many activities, it is suggested the teachers ‘reflect aloud’ and thereby model to students the kinds of questions, language and thinking associated with this task.

# Implementing the unit and activities in the classroom

## Using the unit

The unit can be used in a number of ways. It will be of most benefit to teachers who wish to implement a sustained sequence of activities following the inquiry stages identified on page 5.

## Selecting activities

At each stage several activities are suggested from which you are encouraged to select the most appropriate for your purposes. Not all activities in each stage of the unit need to be used. Alternatively, you may add to or complement the suggested activities with ideas of your own.

The unit identifies a broad age group for which the activities have been written. Again, teachers will be in the best position to determine the appropriateness of content for the students in their class.

Each activity includes all or some of the following headings:

* **Suggested Subject Area:** What subject areas the activity relates to
* **Purpose:** What the activities set out to achieve
* **Preparation:** What the teacher needs to do before hand
* **Procedure:** How the activity proceeds
* **Discussion:** Some of the main points that should be raised and discussed by the class
* **Follow-up**: Suggestions for ways the activity might lead to other investigations and further learning
* **Variations:** Simpler or more complex versions of the activity.

## Resourcing the unit

The resources suggested are on the whole, general rather than specific. Schools and the contexts in which they exist vary widely as does the availability of some resources – particularly in remote areas. There is a strong emphasis in the unit on gathering raw data: interviews, surveys and observations feature strongly as these methods develop important skills and ensure that the exploration of the topics, are grounded in a relevant context. The students and your school are important resources in the unit.

Some You Tube and online videos in addition to Internet based resources are suggested in the unit. You will need to investigate what is available in your school.

## Adapting the unit

The unit is targeted at middle to upper primary aged students 9-12 year olds. This is a suggested age range only and teachers are encouraged to modify activities to suit the needs of their students with whom they are working.

The unit’s topics are based on the needs of teachers involved with The Climate Reality Project, on the key perspective of education for sustainability and embrace content that we believe is of relevance and significance to all students, i.e. becoming more sustainable at school and reducing greenhouse gas emissions to tackle a changing climate. We encourage you to explore ways in which the content can be adjusted to the context in which you are working.

## What about assessment?

Rather than being a task carried out at the end of the unit, assessment is viewed as integral to the entire unit sequence. Each activity should be regarded as a context for assessment of student learning.

When planning and implementing the unit of work make clear decisions on what you will focus on in assessing learning. The unit provides an opportunity for a range of *skills* and *understandings* to be observed. We encourage you to devise a simple assessment plan that features areas to be assessed over subsequent lessons.

In planning for assessment, student learning in the following areas can be considered:

* Understandings about the topic
* Development of skills
* Exploration and clarification of values
* Use of language in relation to content
* Ability to use and critically analyse a range of texts
* Ability to work cooperatively with others
* Approach to learning (independence, confidence, participation and enthusiasm)

For this unit, the following understandings are provided to assist teachers in planning for assessment.

By the end of this unit, students should understand:

* Climate change is a local, national and global issue that has an impact on the survival and wellbeing of a range of cultures as well as many species.
* Many activities undertaken by people in their daily lives are sources of GHG emissions, which includes carbon dioxide emissions (CO2 )
* The reason that climate change is such an issue now is that human actions have been contributing extra greenhouse gas emissions to the atmosphere, potentially changing a number of climates across the world
* The whole school community can become involved in understanding the potential impacts changes to their climate will have on their way of life
* We can calculate and evaluate the impact we and our school community have on our environment
* We can implement action plans with the support of other members of the school community, local councils and other partners to live more sustainably and reduce greenhouse gas emissions
* Individuals, communities and local governments have a responsibility in making informed choices to find a balance to live both comfortably and sustainably and to address the issue of climate change and take positive action.

## Assessment strategies

Each stage in the inquiry sequence provides information about student learning. There are, however, two stages in the unit that are central to assessment: the **engage** stage and the **evaluate** stage. Work that is undertaken in these stages can assist teachers to monitor growth and see concrete examples of the way student ideas have been refined or changed through the unit sequence. Work samples should be retained for this purpose.

## Some questions and possible answers

*Should I do all the activities?*

At each stage of a unit, a number of activities are listed. You would not be expected to do them all. Instead, the unit is designed so that a selection of activities can be made at each stage. You should select the activities according to the needs and interests of your students and the time, relevance to the existing school curriculum and resources available to you.

While you are encouraged to follow the suggested inquiry sequence for each unit, it is quite possible to pick and choose from the range of activity ideas throughout the unit. It may also be used in conjunction with other programs you use.

*How do these units fit into my weekly program?*

Although the unit integrates a range of key subject areas, it is not designed to be a total program. It is assumed that regular routines that operate in your classroom will continue to run alongside your unit of work. For example, you may have regular times for use of the library, for maths, physical education etc. These things don’t change – although student’s writing topics or choice of topics to research in the library or in ICT classes may be may be influenced by this unit.

*How long should the unit run?*

This will of course depend on your particular circumstances but generally, a few weeks to a term is suggested.

*I don’t know much about climate change myself – will I be able to teach it effectively?*

Yes! The unit is designed in such a way that you, as the teacher are a co-learner and you are provided with teacher notes, plus the resources are mainly web-based and are readily available. Most importantly, you will find that you learn with the students and make discoveries with them.

# Unit 1 - Primary

## Teacher Notes

This unit encourages students to examine aspects of climate change and the things that schools are doing to become more sustainable. Students are encouraged to think about what factors can affect climate change, to realise that much of what we do is a product of the context in which we find ourselves.

The unit also explores the idea that each of us can learn together how our schools can be part of the global solution to climate change. The things we do, how we think, our ability to adapt and change and our surrounding environment creates the context to help us inspire action at school, at home and in the community.

As the unit progresses, the emphasis shifts to investigating concepts and ideas relating to sustainability and the reduction of greenhouse gas emissions - both within the students immediate classroom and beyond it. Through integrating environmental management into teaching and learning students are encouraged to consider actual conditions experienced by themselves and others, and be part of the process of understanding, documenting and improving the school.

Having explored some of the complexities of climate change in the early part of the unit, students then consider how they might increase sustainability in the classroom or school whilst reducing greenhouse gas emissions. They think about how climate change has been portrayed by others and in turn consider the changes suggested by others as being needed to increase levels of sustainability and decrease greenhouse gas emissions.

Many of the activities are designed to define an action or project for making a change in the classroom or school. The types of actions that could be undertaken are examined through a number of case studies of schools actively involved in reducing greenhouse gas emissions and through several structured critical thinking and research activities.

Finally, the students develop an action idea for improved sustainability and reduced greenhouse gas emissions for presentation to others. Students are encouraged to communicate solutions for improved sustainability in the classroom or at school.

**Year levels:** Middle and upper primary

## Curriculum focus

In this unit, students:

* Investigate what climate change is
* Assess the current situation at the school
* Investigate concepts and ideas relating to the school’s carbon footprint, climate adaptation and sustainability
* Consider what could change in the school and why
* Generate ideas and explore options for making a change
* Select ideas for an action or project
* Develop an idea for improved sustainability and reduced greenhouse gas emissions, and
* Share the idea for improving sustainability, adapting to climate change and reducing the carbon footprint of the school.

# Discussing climate change – science facts

This page gives some basic climate change science information that may be helpful when you interact with the school students.

* There is now wide scientific agreement that the world is heading for at least a two degree warming by 2070.
* By closely monitoring the Earth’s climate system and oceans and studying the influence of greenhouse gases, the science tells us that our climate is changing.
* The idea that the global climate is changing because of the effect of human activities has been around for decades.
* We now see convincing evidence of a changing climate, and research indicates the climate will continue to change.
* The terms ‘weather’ and ‘climate’ are sometimes used interchangeably, but they refer to different things. Weather is the brief, rapidly changing condition of the atmosphere at a given place and time, influenced by the movement of air masses. Climate is the average weather conditions over longer periods of years to decades.
* There are two main responses to climate change: reducing emissions of greenhouse gases (referred to as mitigation) and managing the impacts (referred to as adaptation).
* Climate change mitigation refers to the actions that aim to reduce the amount of greenhouse gas emissions from a wide range of industrial and agricultural activities, or by increasing the amount of carbon dioxide taken up and stored in natural ‘sinks’ such as forests and soils.
* Climate change adaption involves taking action to adjust to, or respond to the effects of changes in climate.
* The energy we use in our homes, schools and cars, the food we eat and the things we buy can all affect how much greenhouse gas we produce.
* There is a lot of information on climate change science available in the media and on the internet – but how can you be sure what you are reading is independent and not influenced by personal, social or political agendas? Science relies on the continued questioning and challenging of ideas. The peer-review process provides a mechanism to quality control scientific discourse and therefore peer reviewed papers provide a reliable and quality assured source of information on climate change science.
* With the emergence of Climate Change as a popular topic for study and discussion, there are many websites dealing with the issues. While these sites may contain basic information, teachers and students need to be alerted to check the authority of each website carefully and decide whether the information is sufficiently reliable to be used as a basis for their own work.
* It may be useful to reflect on the following principles when evaluating print, multi-media and web-based information on climate change.
* Integrity - scientific concepts are accurately presented and verifiable.
* Balance - accurately reflects the broad range of informed opinion on the subject.
* Scientific inquiry –is open to inquiry and encourages the reader to ask questions.
* Visual presentation - visual representations accurately depict the scientific concepts.

# Stage 1: Engage with the topic climate change

## Step 1.1 Getting started – a brainstorm, discussion

**Suggested Subject Area: Literacy**

**Purpose**

To provide students with opportunities to:

* Gather information about student’s prior knowledge about climate change
* Pool ideas and share with others
* Assist students to organise the ideas they have about climate change
* Develop skills in making connections between ideas
* Help set directions for an investigation
* Provide data for assessment purposes.

**Preparation**

You will need:

* Paper
* Small cards
* Copy of glossary in Resource 1.1 for all students
* Access to the Internet

**Procedure: A Brainstorm**

Each day we behave in particular ways, use particular technologies and manage our school spaces using a variety of resources. We may use energy to keep warm or stay cool; water for drinking and watering; and cars and buses as ways to get from one place to another. The energy and resources we use can release a variety of gases into the atmosphere that trap heat from the sun and cause the earth to warm up.

The energy we use in our school, home and cars, the food we eat and the things we buy can all affect how much greenhouse gas we produce. The good news is that we can save energy and water, reduce our school’s running costs and remain comfortable, we can look at our diets and be healthier and we can look at how we make purchases and save money...and all these strategies can reduce greenhouse gases and reduce global warming.

Use the ‘pass the question’ strategy outlined below, to complete a brainstorm.

* Divide the class into two working groups
* Record one question on each sheet of paper: *‘*What do we understand about climate change?’; ‘What is global warming? We have heard about it in the media and from scientists, but what does it mean for us and what can we do about it?’
* Distribute the sheets of paper, one to each group
* Ask students to brainstorm their responses to the questions
* After a designated period of time, each sheet is passed to the next group, where students add to the ideas already written by the previous group
* Continue this activity until students are satisfied that the questions have been answered

Each group reports to the class, synthesising ideas collated by the class. Display brainstorm lists around the classroom.

If questions emerge from this activity, record these and display them for reference throughout the unit.

**Discussion**

Consider the words ‘climate change’ and ‘global change’. List other words that students associate with them. For example: global warming, carbon pollution, greenhouse gas emissions, weather, the Greenhouse Effect. Investigate definitions and any associations the words may have.

Issues surrounding climate change can have many confusing terms and technical jargon. Ask students what they think the difference is between:

* Carbon pollution and greenhouse gas emissions
* Global change and climate change
* Greenhouse effect and enhanced greenhouse effect
* Climate and weather

Why is it important to make distinctions between these terms? Present them with a range of resources, such as the Glossary in ***Resource 1.1*** and the internet. Ask them to compare their research with their original ideas.

**Follow up**

Ask students to develop a **concept map** describing what they know about climate change, what it is, what it comprises, what it affects, and why it’s important.

**Procedure**

**Step 1:** Give each student 10 small cards.

**Step 2:** On one card they write the word/phrase that is the subject for the topic (e.g. climate change)

**Step 3:** On the remaining cards they write/draw other words that they consider to be important in relation to the topic.

**Step 4**: The cards are arranged in a way that makes sense to the student.

**Step 5:** Students then show the way these ideas relate to each other by drawing lines or arrows between the related ideas. Words or connecting phrases are written on the line or arrow to make the connection clearer.

**Step 6:** Generalisations can then be formed on the basis of the connecting ideas on the concept map.

**Assessment Note**

Concept maps are useful for assessment purposes. Students could complete one at the beginning of the unit and then reconstruct it during and at the end of the unit to demonstrate their changed understandings.

**Variation**

Improve understandings about climate change. Invite students to use the following web based source material to find additional information about climate change. Please note that You Tube videos may not be accessible to students at school.

View an animation at <http://www.youtube.com/watch?v=H6uDiJng-uo> to explore the following concepts:

* The issue of climate change
* Sources of greenhouse gas emissions
* The Greenhouse Effect
* Carbon dioxide
* Global warming
* Potential impacts greenhouse gas emissions can have on human health and the environment
* What we all can do to find a balance to live comfortably and sustainably

View excerpts and, in groups explore the concepts presented and list ideas on a retrieval chart documenting understandings about climate change.

For example:

**Climate Change**

**Name: Date:**

|  |  |
| --- | --- |
| What is climate? |  |
| What is climate change? |  |
| Why is it important to understand climate change? |  |
| What role do greenhouse gases play? |  |
| What types of human activities can be sources of greenhouse gas emissions? |  |
| What can we do to reduce greenhouse gas emissions? |  |
| What can we do to adapt to the changes of the climate? |  |

# Stage 2: Explore ideas relating to climate change

## Step 2.1 Exploring climate change

**Suggested Subject Area: Science**

**Purpose**

To provide students with opportunities to develop their understanding of:

* The relationship between the gases in the atmosphere and the Greenhouse Effect
* How global warming can change the climate
* How climate change can affect people and places
* How we can reduce the impacts of climate change.

**Preparation**

You will need:

* Copy of Resource 1.2 for all students
* Copy of Resource 1.3 for all students
* Small empty plastic bottles
* Baking soda or sodium bicarbonate
* Vinegar
* Balloons
* Spoons
* Copy of Resource 1.4 for all students
* A set of identical thermometers
* Clear plastic bottles
* Plasticine
* Stop watch
* Access to the Internet

**Procedure**

Re-introduce students to the concepts about climate change in a practical way.

* Read an article about global warming. Share ***Resource 1.2*** with the class, ask students to exchange questions about things they are not sure about global warming and then create a list of key statements from the article. Simulate global warming too by asking a student to run on the spot and invite other students who are wearing a jacket on the day to place it over the shoulders of the jogging students, thus demonstrating the layers of warmth surrounding the Earth.
* Make some carbon dioxide.See ***Resource 1.3*** and explore with the students how a reaction between two different substances – a solid (bicarbonate soda) and a liquid (vinegar) – can create a third new substance such as carbon dioxide gas. Invite students to contrast the differences between the compound ‘acetic acid’ (vinegar), the compound sodium bicarbonate and carbon dioxide gas. Ask where the gas came from and where it would it go once it was released.
* Make a bottled greenhouse. Share ***Resource 1.4*** with the class and investigate how a material can trap radiation from the sun and increase the temperature of a gas within.
* Use the climate exchange website at <http://climatexchange.aspacnet.org/> to learn more about places and people globally affected by a changing climate. Explore a range of places and people. Ask questions like:

What is this place like?

What do people do here?

What is happening in this place?

Could this place be anywhere else?

How is this place affected by climate change?

How are people adapting to changes being experienced?

## Step 2.2 Picturing climate change – using a global perspective

**Suggested Subject Area: Visual Literacy**

**Purpose**

To provide students with opportunities to:

* Become familiar with some of the values, viewpoints and different perceptions of climate change from a range of places globally
* Become familiar with art as one way of crystallising and communicatingvalues.

**Preparation**

You will need:

* Access to the Internet or a colour print out of a few student work samples from the internet site

**Procedure**

Explore how young people globally see climate change. Present students with a sample of artwork from the 18th International Children’s Painting Competition on the Environment at <http://www.unep.bayer.com/en/International-Children_s-Painting-Competition-18.aspx>

View artwork from Russia, India, China, Iran, Brazil, Ukraine, USA, Japan, Australia, Germany, Qatar and Brunei.

Also, check out the regional winners from Portugal, China, Bahrain, Egypt, Chile and USA.

**Discussion**

Discuss how climate change messages about adapting to changes are being communicated within the artwork, asking students to focus on what they think the artists are trying to say. What are some similarities between the images? What are some differences? Do the artists seem optimistic about the future or concerned? Note the student ideas of actions that can be implemented to adjust and adapt to the uncertainties of a changing climate. Discuss these.

**Follow up**

Students can imagine, either as individuals or in small groups, that they can commission one of these artists to design a poster about their own school and its activities that produce greenhouse gas emissions. Which artist would they approach first? Which next?

Or, invite students to draw, paint or create their own artworks sharing their local stories about what is changing in their community.

## Step 2.3 Making connections

**Suggested Subject Area: Environmental Education/Literacy**

**Purpose**

To provide students with opportunities to:

* Discuss ways greenhouse gas emissions can be reduced at the school
* Discuss ways we can adapt to changes in our climate
* Develop the skills of discussion, negotiation, critical thinking and analysis of visual material.

**Preparation**

You will need:

* Access to the Internet or a colour print out of an image of a possible sustainable school from the second suggested internet site

**Procedure**

Our carbon footprint is a measure of the total amount of greenhouse gas emissions, particularly carbon dioxide, caused by our daily activities, for example:

* Using energy at school and for transport
* Producing the food we eat and the goods and services we use
* Disposing of waste products

Introduce students to ways greenhouse gas emissions can be reduced, e.g. reduce electricity use; reduce our use of vehicles that burn fuel and reduce using products that require fuel and electricity to produce.

View the You Tube video Food Water Energy For all For Ever at <http://wwf.panda.org/about_our_earth/aboutcc/>

Climate change adaption involves taking action to adjust to, or respond to the effects of changes in climate. Talk with students about the many things we can do to adapt to changes in our climate.

**Discussion**

Discuss how each of the actions, (both mitigation and adaptation) described requires one person to make a difference.

Focus on activities that emit sources of greenhouse gases from a class or a school source. Ask students to brainstorm a list of ways greenhouse gas emissions are being produced at school and released into the air. Compile these onto a large class list and classify.

**Follow up**

Working in small groups, ask students to view the image of a possible school that is tackling climate change and living sustainably at <http://www.sustainableschools.act.gov.au/>

Ask students to share things that they can do to tackle climate change at their school that they see represented in the graphics. For example:

* Ride a bike or walk to school
* Use window blinds (if available) to cut down on the heating effects of the sun
* Compost green waste and food scraps
* If possible, work away from direct sunlight or sources of radiant heat in summer
* Refuse, reduce, re-use and recycle
* Plant trees and shrubs to absorb (sequester) carbon
* Grow your own food
* Raise the issue with the teachers or, if you can with the school Principal.

**Variation**

Find local examples of schools living sustainably, adapting to climate change and reducing greenhouse gas emissions.

Check out these schools in **Indonesia**.

Sekolah Alam Indonesia (Nature School/School of the Universe) [http://www.sekolahalamindonesia.org/](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.sekolahalamindonesia.org%2F&lang=en)

Sekolah Sobat Bumi (Best Friends of the Earth School) [http://www.sobatbumi.com/interest/browse](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.sobatbumi.com%2Finterest%2Fbrowse&lang=en)

Sekolah Adiwiyata (Ministry of Environment Programs on Green School) <http://www.menlh.go.id/informasi-mengenai-adiwiyata/>

## Step 2.4 Research task 1: Consider the current situation at the school

**Suggested Subject Area: Numeracy/ Environmental Education**

**Purpose**

To provide students with:

* A focus for the forthcoming experiences in the ‘Explain’ stage of the inquiry
* Opportunities to complete a survey designed to show where their views lie, leading to a discussion of the implication of particular perspectives.

**Preparation**

You will need:

* A copy of Resource 1.5 for all students

**Procedure**

Ask students why it might be important to understand the current situation at the school. List the students’ responses. Sort responses and ask students to give reasons for their suggestions. Explain to the students that in later stages of the unit they will be developing a proposal for improved sustainability at the school.

Undertake a survey about your school using ***Resource 1.5***.

**Discussion**

Encourage students to brainstorm what investigations or surveys they might need to undertake to understand the school’s carbon footprint and opportunities to adapt to climate challenges. Invite students to consider questions like:

* How they might survey classes and teachers about their use of water or energy; disposal of waste products such as paper, food scraps and packaging; use of transport; and foods eaten?
* How might they collect the ideas and voices of students and teachers about ways the school might adapt to a changing climate?
* Who the people or stakeholders are at the school that they might need to consult to find out more about how they manage the school spaces that impact on the school’s carbon footprint.
* How can we increase sustainability in our school while reducing greenhouse gas emissions?
* What might need to change in the school and why?

Explain to the students that in the next part of the unit they will be investigating the current situation at the school and undertaking a survey of their choosing, i.e. an energy survey, water survey, waste survey, travel survey and/or biodiversity survey.

Encourage students to brainstorm ways that they think this might be possible.

**Follow up**

Complete the engaging and exploring phases of the unit by brainstorming the students’ response to the question: What do we think needs to change in our school about our carbon footprint and why? How can we adapt our lifestyles to cope with the changes to the climate that we are experiencing?

Additional questions could be:

* What did we find out?
* Do we need to learn more?

# Stage 3: Explain how schools can reduce greenhouse gas emissions

## Step 3.1 Research task 2- Pathways to action

**Suggested Subject Area: Environmental Education/Geography/ Literacy**

**Purpose**

To provide students with opportunities to:

* Use a variety of comprehension, questioning and writing techniques to examine a variety of actions to improve sustainability adapt to climate change and reduce their carbon footprint.
* Understand the meaning of actions to improve sustainability, adapt to climate change and reduce their carbon footprint
* Develop skills of comprehension, interpretation and presentation of written and photographic material
* Access new information which may answer some of their earlier questions
* Raise other questions for students to explore in later activities
* Generate both a personal and a group list of ideas.

**Preparation**

You will need:

* Access to the Internet or a print out of a number of case studies about sustainable schools in Australia, Indonesia and/or European countries.

**Procedure**

Other schools and the community have used a variety of actions to improve sustainability, adapt to a changing climate and reduce their carbon footprint.

In groups, invite students to decide upon how they could improve sustainability, consider ways to adapt to cope with changes to the climate and reduce the school’s carbon footprint by reflecting on the variety of actions that are undertaken in other schools. Ask questions like:

* What types of action could we undertake?
* Are some solutions more sustainable than others? Why?
* How will we know if the changes we make have been successful in using energy more sustainably?

Read some case studies about the increasing numbers of schools which are factoring sustainable actions, the need to change and their carbon footprint forecasts into their management decisions. Ask students to use the case studies to collect reference material about how other schools have approached some climate and sustainability issues in their schools and the solutions they developed as a school community.

Students work in groups. Each group is to locate relevant information on what schools are doing within the Australian Sustainable Schools Initiative (AuSSI) or the Green School in **Bali, Indonesia**, to reduce greenhouse gas emissions at school and in the community.

See:

* Australian Sustainable Schools Initiative (AuSSI) <http://www.environment.gov.au/education/aussi/case-studies/index.html>
* Green School <http://www.greenschool.org/>
* Eco Schools <http://www.eco-schools.org/>
* Carbo Schools <http://www.carboeurope.org/education/>

Encourage students to research, list and describe the various projects and initiatives in use within one or more of these schools that encourage schools to improve sustainability and reduce the school’s carbon footprint.

**Discussion**

Talk with the students about approaches that can help the school and its community adapt to climate change as well as mitigate greenhouse gas emissions. Invite students to consider some of the ways other children are adapting to their circumstances.

See: [http://www.savethechildren.org.au/what-we-do/climate-change-and-disasters/climate-change-adaptation](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.savethechildren.org.au%2Fwhat-we-do%2Fclimate-change-and-disasters%2Fclimate-change-adaptation&lang=en) where children and communities are:

* Coping with drought
* Building contours around the school and community to conserve water
* Harvesting rainwater in underground tanks
* Growing crops in alternative ways
* Using drip irrigation to water plants
* Drying food and storing it for the monsoon and wet seasons
* Planting bamboo along rivers to stop erosion, and
* Increasing awareness and skills in the local community to understand the risks and impacts of climate change on people, livestock and crops.

## Step 3.2 Survey your school

**Suggested Subject Area: Environmental Education/ Numeracy/ Literacy**

**Purpose**

To provide students with opportunities to:

* Use a variety of comprehension, questioning and writing techniques to examine and complete surveys designed to show information about energy and water use, waste generation, transport options and/or biodiversity at the school
* Understand the meaning of actions to improve sustainability, adapt to climate change and reduce their carbon footprint
* Develop skills of comprehension, interpretation and presentation of survey data
* Access new information which may answer some of their earlier questions
* Raise other questions for students to explore in later activities
* Generate an action plan with a list of ideas that can reduce greenhouse gas emissions at the school
* Draw and communicate graphically their image of how they would like their school to be.

**Preparation**

You will need:

* A copy of Resource 1.6 or 1.7 or 1.8, or 1.9 or 1.10 for all students

**Procedure**

Other schools and the community have used a variety of actions to improve sustainability, adapt to a changing climate and reduce their carbon footprint.

Discuss with students that surveys are lists of questions that can be used to collect data from a ‘sample’ group. This group represents a larger population. The larger the sample, the more likely it is that it will represent the population.

Select students to conduct an **energy survey** of a classroom and map items that require energy. See ***Resource 1.6.***

Where possible, in small groups use a smart meter or ‘Power Mate’ to survey energy consumption of different appliances within the school. Discuss areas within the school in which energy is consumed or create a diagram representing student/class energy usage at school.

Brainstorm options for conserving energy and reducing greenhouse gas emissions in all areas of the school that have been identified as users of energy and sources of greenhouse gas emissions.

Water can be a key element when examining the environmental impact of a school. Select students to conduct a **water survey**. Use ***Resource 1.7*** to examine the use of drinking quality water.

Whether you recycle your **waste** or not at school can impact on the school’s carbon footprint. Select students to investigate where resources are used around the school and look for ways to reduce the amounts used. See ***Resource 1.8***.

Select students to conduct a **travel survey**. Use the survey in ***Resource 1.9*** to allow the class to examine the way they travel and help inform how they could better use the different ways of travelling.

All schools exist within ecosystems. The school grounds or nearby green spaces all contain plants and some may sequester (or absorb) carbon. Select students to conduct a **biodiversity survey** in ***Resource 1.10*** to map the existing biodiversity near or in and around your school.

**Discussion**

Ask groups or the class as a whole to discuss problems or issues identified from the surveys.

**Follow up**

As a class prepare an action plan that defines how the class and each student can personally improve sustainability, adapt to change and reduce the school or their classroom’s carbon footprint.

The plan could look like this:

**Ways we can reduce our carbon footprint**

**1.**

**2.**

**3.**

**4.**

**5.**

**6.**

**Ways we can adapt our lifestyles to cope with changes to the climate**

**1.**

**2.**

**3.**

**4.**

**5.**

**6.**

Or students could be asked to draw the school as they’d like it to be, or consider a more detailed plan with the following headings.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **What** | **How** | **When** | **Who and what’s needed** | **How will we know if it worked** |
|  |  |  |  |  |

# Stage 4: Elaborate and work together for change

## Step 4.1 Plan a project for change

**Suggested Subject Area: Environmental Education/ Literacy**

**Purpose**

To provide students with opportunities to:

* Consider the idea of recycling as one way of being a more sustainable school, conserving resources and reducing greenhouse gas emissions
* In groups discuss, evaluate and make decisions about sustainability projects
* Understand the meaning of actions to improve sustainability and reduce their carbon footprint
* Reflect on their own values and priorities for their school and to consider some practical ways in which they can influence changes at the school
* Develop skills of cooperative decision-making
* Generate a personal and group list of ideas
* Encourage sharing of ideas and to learn from one another.

**Preparation**

You will need:

* Access to some real or hypothetical projects for change. The case studies in the earlier activity can help
* A blank class chart similar to the one in Resource 1.11

**Procedure**

Make a list with the class of the most common items that are regularly thrown away at home and at school.

In small groups, each group selects one item and brainstorms all the possible ways that the item could be re-used. They also select one or two ideas that they think are the most practical and useful.

Build a ‘sense of community’ in the class and explore and clarify the agreed direction for an action or a range of actions or a project for change at the school. Ask students to:

* In groups generate their ideas about the direction for action or project.
* Work in groups of three to combine their ideas into one list of statements. Ideas are discussed, modified, justified, included or rejected until a list is agreed upon.
* Compile the final list of statements and display for discussion.

**Discussion**

Explore the wide range of effects that can follow from actions, issues or their project ideas.

**Follow up**

A recycling programme could be started.

Plastic bags could be recycled, crocheted, knitted or sewn together to make warmer and waterproof clothing items.

Large containers could be recycled and cleaned to capture and store water in.

Newspapers could be recycled and bricks could be made with mud for burning in times of cold.

## Step 4.2 Make the changes

**Suggested Subject Area: Environmental Education/Literacy**

**Purpose**

To provide students with opportunities to:

* Take a responsible part in action for change in their school, thus giving them a small experience of influencing the future
* Make links between their understandings and their experience in the world at school
* Make choices and develop the belief that they can make a difference.

**Preparation**

You will need:

* Lots of class ideas for suitable sustainability actions or projects

**Procedure**

Set goals and take action in class teams. Students might:

* Increase the area of the school grounds that are planted with local native vegetation and local native habitat
* Protect indigenous vegetation from removal
* Plan for an additional carbon forest, an increase in habitat for animals or corridor planting
* Offset carbon by undertaking tree planting activities
* Encourage the broader community to shift towards more sustainable gardening practices and processes
* Encourage the broader community to shift towards more sustainable water harvesting practices and processes
* Plant a food garden
* Switch things off and reduce energy consumption
* Promote awareness of sustainable energy use among the school community
* Encourage cycling and walking for the school population as a form of transport to school
* Place additional bins around the school
* Start a recycling programme
* Start a composting programme
* Start a worm farm
* Suggest rubbish free lunch days

Define the roles of each team students then vie for their preferred positions based on the skills they believe they possess. Once ideas have been decided on teams begin the task of organising in their roles.

**Discussion**

Explore the wide range of ways to inform others about what you are doing. Create posters, pamphlets or books to help others understand what to possibly change, how to be change agents and change things at the school.

**Follow up**

Hold a class meeting in front of parents and friends where students demonstrate their understandings of how to be a more sustainable school and reduce greenhouse gas emissions that contribute to a changing climate.

**Assessment Note**

Student writing or drawing samples in their posters, pamphlets or books to help others understand what to possibly change, how to be change agents and change things at the school may provide information about student learning.

# Stage 5: Evaluating

## Step 5.1 Think back and evaluate

**Suggested Subject Area: Literacy**

**Purpose**

To provide students with opportunities to:

* Reflect on their own learning
* Provide a source of data for assessment.

To provide teachers with:

* insights into students’ understandings and attitudes, as well as their perceptions of their own strengths and weaknesses.

**Preparation**

You will need:

* A Learning Log booklet from Resource 1.12

**Procedure**

Begin by modelling reflective writing through a whole class learning log. Alternatively, you could model your own entry ‘thinking aloud’ as you write.

Provide students with a set of focus questions for their writing:

* Write about something new you learnt in this unit.
* How did you feel about the activities you undertook?
* What might you do differently if you were to do this again?
* How have my/our feelings and behaviour changed as a result of my learning?
* How well did I/we participate in any group/team learning activities?
* How can I/we make similar changes and improvements in other sustainability areas?
* What questions do you have about the topic at the moment?

**Assessment note**

Learning logs are ideal to assist students to reflect on their learning and can provide a source of data for assessment. They can provide teachers with an insight into student’s understandings and attitudes as well as their perceptions of their own strengths and weaknesses.

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<http://www.sustainableschools.act.gov.au>

**Australian Government**

<http://www.environment.gov.au/education/aussi/case-studies/index.html>

**Carbo Schools**

<http://www.carboeurope.org/education/>

**Children in a Changing Climate Research Report**

<http://www.slideshare.net/dipechonepal/child-voices-finalreport>

**Climate eXchange**

<http://climatexchange.aspacnet.org/>

**Eco Schools**

<http://www.eco-schools.org/>

**Green Flag Schools**

<http://www.greenschoolsireland.org/>

**Green School**

<http://www.greenschool.org/>

**Indonesian Schools**

Sekolah Alam Indonesia (Nature School/School of the Universe) [http://www.sekolahalamindonesia.org/](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.sekolahalamindonesia.org%2F&lang=en)

Sekolah Sobat Bumi (Best Friends of the Earth School)

[http://www.sobatbumi.com/interest/browse](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.sobatbumi.com%2Finterest%2Fbrowse&lang=en)

Sekolah Adiwiyata (Ministry of Environment Programs on Green School) [http://www.menlh.go.id/informasi-mengenai-adiwiyata/](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.menlh.go.id%2Finformasi-mengenai-adiwiyata%2F&lang=en)

**Practical Action**

<http://practicalaction.org/climate-change-resources>

**Save the Children**

[http://www.savethechildren.org.au/what-we-do/climate-change-and-disasters/climate-change-adaptation](https://service.mail.com/dereferrer/?target=http%3A%2F%2Fwww.savethechildren.org.au%2Fwhat-we-do%2Fclimate-change-and-disasters%2Fclimate-change-adaptation&lang=en)

**UNEP Bayer Partnership 2009 Painting Competition**

<http://www.unep.bayer.com/en/International-Children_s-Painting-Competition-18.aspx>

**YouTube**

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<http://wwf.panda.org/about_our_earth/aboutcc/>

# Resource pages

## Resource 1.1

**Glossary**

**A**

**acid rain**

It’s not only the carbon in fossil fuels that is burned to form an oxide. Sulphur dioxide and nitrogen dioxide are also products that can created problems. Dissolved in water, the solution forms an acid, which can dissolve materials such as limestone, harm plants and alter the pH of soils and water supplies.

**air pollution**

Chemical, biological or particulate matter that changes the characteristics of the atmosphere. Two examples of harmful air pollution are car exhausts emitting carbon monoxide and coal burning producing sulphur dioxide.

**atmosphere**

The mixture of gases surrounding the Earth, any star or planet.

**abatement**

Any action to reduce the emissions of greenhouse gases from human activities. Abatement acts on a global level over long time scales, slowing the rate of climate change and delaying or deferring the date of impact and its magnitude. While we may individually contribute only a small amount to global emissions, as good global citizen we must take responsibility for our own emissions and work to reduce them.

**adaptation**

Any action to respond to the anticipated or actual conditions related to climate change. Such strategies can reduce our vulnerability to a change in climate at the local and regional level and over short time scales. They allow communities to develop a capacity to avoid or minimize the negative effect of climate change.

**C**

**carbon dioxide**

A colourless odourless gas formed by the burning of carbon compounds or breathed out by animals in respiration. The burning of fossil fuels (oil, coal and natural gas) to create electricity and produce fuel for transport is increasing the amount of CO2 in the atmosphere.

**carbon neutral**

Being carbon neutral means that you produce no net emissions of carbon such as carbon dioxide or methane either directly or indirectly.

**carbon trading**

The buying and selling of permits allowing people to emit set amounts of carbon in the atmosphere

**chlorofluoro-carbons(CFCs)**

These chemical compounds have no natural source: they are produced entirely by human activity. Even though CFC production has been vastly reduced (previously used in aerosol cans and refrigerators), they will remain in the atmosphere for a long time.

**climate**

The long-term average weather pattern of a region.

**climate change**

Changes to the climate systems such as the current global warming.

**D**

**direct impact**

Something that has a direct and instant impact on the earth e.g. bushfires, major volcanic activity.

**E**

**energy**

The power which lets people and machines move, or provides light and heat.

**emissions**

Sending gases out into the atmosphere.

**emission target**

Limitations to reduce the release of air-borne substances.

**emission trading**

Under an emissions trading scheme, limits (or caps) are set on the amount of a pollutant (greenhouse gas) that can be emitted. Companies or groups are given credits that represent the right to emit a specific amount. (Linked to carbon trading)

**enhanced greenhouse effect**

The increase in the concentration of greenhouse gases in the atmosphere due to human activity leading to climate change.

**F**

**fugitive emissions**

Emissions resulting from transporting energy from generators to customers (e.g. through powerlines).

**G**

**gases**

A gas is one of the states of matter, consisting of particles well spaced and moving randomly and rapidly in all directions.

**greenhouse gases**

Gases that absorb heat in the Earth’s atmosphere. There are around 30 greenhouse gases, of which CO2, methane and water are currently considered to be the most important.

**greenhouse effect**

The Greenhouse Effect refers to the change in temperature an atmosphere displays as certain gases trap heat. This extra heat changes the rate of movement of air and ocean currents, makes their masses expand and increases the rate of ice melting and evaporation.

**global warming**

The warming of Earth’s surface through an increase of greenhouse gases in the atmosphere.

**H**

**hydro fluorocarbons (HFCs)**

Gases that are used in aerosol cans, air conditioners, production of aluminium and magnesium and in semi conductor manufacture.

**I**

**indirect impact**

Something that has secondary impact on lifestyles, ecosystems, societies and cultures.

**K**

**Kyoto Protocol**

The Kyoto Protocol is a global agreement that aims to limit greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-caused) interference with the climate system. It was developed under the United Nations Framework Convention on Climate Change.

**M**

**methane (CH4)**

A naturally occurring gas generated by (Greenhouse gas) bacteria that break down organic matter. The main sources of methane production are the digestive processes of livestock, the cultivation of rice, escaping natural gas and decomposing waste in garbage dumps or landfills, and volcanic and geothermal activity.

**N**

**nitrous oxide N**2**O (Greenhouse gas)**

A gas that forms when fossil fuels are burnt under certain conditions.

**O**

**ozone (O**3**)**

A colourless gaseous substance obtained (as by the silent discharge of electricity in oxygen). It is an allotropic form of oxygen, containing three atoms in the molecule instead of the more abundant form, O2.

**P**

**pollution**

Dirt or harmful substances in the air, water or soil.

**S**

**smog**

Is a mixture of smoke and fog produced by industry, motor vehicles, incinerators and open burning. Smog hangs around over densely populated cities.

**stationary energy**

Energy used to heat, cool and light our houses, offices and other buildings.

**sulphur hexafluoride (SF**6**), hydro fluorocarbons (HFCs) and Per fluorocarbons (PFCs)**

Gases created by processes such as aerosol use, air conditioners, production of aluminium and magnesium and used in semi conductor manufacture.

**W**

**weather**

The state of the air or atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness, or any other meteorological phenomena; meteorological condition of the atmosphere; as, warm weather; cold weather; wet weather; dry weather, etc

Source: ACT Department of Territory & Municipal Services, Educating for Sustainability through the ACT Curriculum – Climate Change for a Sustainable Future, Canberra, pp19-20

See <http://www.sustainableschools.act.gov.au>

## Resource 1.2

**The heat is on**

Global warming caused by the enhanced greenhouse effect is the hottest problem of the century. The increasing temperatures on Earth may turn our normal weather patterns upside down, causing floods, droughts, rising ocean levels . . . and that’s just the beginning.

The natural greenhouse effect is actually important for the survival of all life on Earth. The atmosphere surrounding our planet is made up of gases such as nitrogen and oxygen, along with smaller amounts of ‘greenhouse gases’, including water vapour, carbon dioxide and methane. This atmosphere allows heat from the Sun to pass through to warm the surface of the Earth while also allowing some of this heat to escape back out to space. This keeps the Earth’s surface at just the right temperature for living things; not too hot and not too cold. Without our atmosphere, the Earth would have an average temperature of around minus 18°C.

The problem is that over the past 200 years humans have been producing a lot of extra greenhouse gases. By burning fuels such as oil, coal and gas, we've raised the amount of carbon dioxide in the atmosphere by more than a third. Methane gas levels have more than doubled, and other gases have also increased. As the atmosphere gains more greenhouse gases, it's also getting warmer, and allowing less of the heat that is reflected from the Earth to escape out to space. So the planet is slowly warming up. At the same time we're cutting down lots of trees — which breathe in carbon dioxide — so we're getting rid of one of the ways we can reduce carbon dioxide levels.

Why do we care about global warming? After all, doesn’t it mean we won’t have to rug up so much in winter, our summers will be nice and warm, and life might become a bit easier in cold places such as Siberia and Alaska? Unfortunately, global warming is a lot more complicated.

Along with the atmosphere, the oceans are warming, though much more slowly. As the oceans heat up, they expand or get bigger, resulting in sea level rises that could flood low-lying areas on coasts. Major icefields are also melting and this will also contribute to major sea level rises.

Rainfall patterns may also change, so that some areas will get a lot more rain and others will get none at all. While we may be able to grow some crops in areas that used to be too dry, it could mean that some farming areas will dry up or become too wet for crops. We aren’t sure exactly what will happen, where it will happen, or when but scientists do have predictions based on their studies.

Many scientists believe that we're already beginning to feel the effects of global warming, but this doesn't mean it is too late for us to fix the problem before it gets worse. If we can reduce the amount of greenhouse gases we produce, and plant more trees, we can cool global warming.

Source: CSIRO Education, *Scientriffic*, Issue 1, May-June 1999, pages 10-11

## Resource 1.3

**Make Some Carbon Dioxide**

You will require:

* Empty small soft drink bottle
* Vinegar
* Bicarbonate of soda
* Balloon
* Spoon

You will need to:

* Measure and place 100ml of vinegar in the bottle.
* Using a spoon half fill the balloon with bicarbonate of soda.
* Carefully stretch the balloon over the mouth of the bottle.
* Hold the balloon upright and shake bicarbonate soda into the bottle – ( the balloon should start blowing up).
* Observe what is happening in the bottle – the bubbles of gas filling up the balloon are carbon dioxide.

Think about what’s happening.

When vinegar and bicarbonate of soda mix together, there is a fast chemical reaction. There are several products of the reaction, although it is the carbon dioxide gas (C0**2**) that inflates the balloon. As more carbon dioxide is produced, the bits of carbon dioxide (called molecules) are squashed together and begin to push, or apply a force, on all the inside surfaces thus inflating the balloon.

As vinegar (dilute acetic acid) is a weak acid and baking soda (sodium bicarbonate) is a weak base, it is an example of an acid-base reaction. The equation is shown below:

**CH3COOH + NaHCO3 NaCH3COO + H2CO3***Acetic acid plus sodium bicarbonate makes sodium acetate plus carbonic acid*

Source: Introduction to CCS, CSIRO/ Global CCS Institute, 2012, page 27.

## Resource 1.4

**Make a bottled greenhouse**

You will require

* Two identical thermometers
* A clear plastic bottle
* Plasticine
* Stop watch

You will need to:

* 1. Place one thermometer in an empty soft drink bottle so that you can see the numbers clearly. Hold it in place and completely seal it with plasticine.
  2. Take both thermometers outside on a sunny day and place the other thermometer somewhere beside the bottle.
     + What is the starting temperature on each thermometer?

Starting temperatures: 1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + - Record the temperatures every two minutes for ten minutes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 2 | 4 | 6 | 8 | 10 |
| Thermometer 1 |  |  |  |  |  |
| Thermometer 2 |  |  |  |  |  |

* + - What do you notice?

What’s happening?

The temperature inside the bottle warms up faster than the temperature outside the bottle. The bottle acts like a greenhouse, trapping the sunlight and making the temperature inside warmer.

Greenhouse gases are gases released by cars and other vehicles, and from the process of making electricity. When greenhouse gases enter the Earth's atmosphere, they have the same affect on Earth — heating it up like a greenhouse.

Extension

How could you change this activity to test the above explanation?

What other factors do you think might influence the rate temperature increases in the bottle? How might you test this?

Source: CSIRO CarbonKids Understanding Climate Change Unit page 24.

## Resource 1.5

**Rate your school**

The purpose of this activity is to identify positive and negative aspects of your present school environment.

**Method**

Give each item a score from 1 to 10 for how “sustainable” your school is. One is ‘poor’ and ten is ‘great’.

**Energy Conservation**

**1 2 3 4 5 6 7 8 9 10**

**Paper Conservation**

**1 2 3 4 5 6 7 8 9 10**

**Water Conservation**

**1 2 3 4 5 6 7 8 9 10**

**Recycling**

**1 2 3 4 5 6 7 8 9 10**

**Use of bikes, walking and public transport**

**1 2 3 4 5 6 7 8 9 10**

**Waste Conscious canteen, tuck shop**

**1 2 3 4 5 6 7 8 9 10**

**Conservation of the natural environment**

**1 2 3 4 5 6 7 8 9 10**

**Teaching of environmental education**

**1 2 3 4 5 6 7 8 9 10**

## Resource 1.6

**Energy**

Sustainable schools make the most out of free energy from the sun and are careful with energy that comes to the school from outside sources. Simple and practical things like the installation of blinds, and the planting of trees to shade windows can reduce a school’s need to use energy to keep rooms cool or warm. You can also of course turn off lights, computers and other appliances when you are not using them.

**Survey rooms**

To reduce energy waste you must first find out where it is used. Your task is to identify the appliances that use energy in the school and record the length of time that each of the appliances is turned on.

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of equipment** | **Number** | **Energy use estimate** | **Comments** (e.g. any problems with the appliance. Did you have any problems finding the information? Note it here if you did.) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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Using the information you have gathered create charts something like this.

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| **Location** | **Issue** | **Action** | **Responsibility** | **Priority** |
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| **Location** | **Use** | **Comments** | **Ideas for reducing energy use** |
| Classroom 1 | Lights | Lights left on during lunchtime | Elect a monitoring team  Create ‘Save it’ stickers |
|  | Computers | Left on all day | Use timers |
| Classroom 2 | Air conditioner | Cool air escapes via gap under the door | Use a ‘door snake’ |
|  | Lights | Not needed near window | Turn off lights |
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Set your school some **goals.**

You goal might be to:

* Reduce energy consumption
* Increase energy efficiency
* Capture energy and store it.

Think about how this could be achieved?

You might consider:

* Use of plants for summer shade and winter sun
* Solar outdoor lights

## Resource 1.7

**Water**

Water can be flowing into and out of your school all the time. Some of it comes from the sky; some from underground pipes or wells that provide water to your school. Investigate where water is used and wasted in your school and consider how you can make the best use of this precious resource.

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Set your school some **goals.**

You goal might be to:

* Reduce water use
* Increase water efficiency
* Capture water and store it

Think about how this could be achieved?

You might consider:

* Storage: tanks, ponds, underground
* Efficiency: taps, wells, drip irrigation
* Swales to guide, slow and filter rainwater.

## Resource 1.8

**Waste**

Sustainable schools keep looking for ways to reduce or avoid waste. What would it be like to have no waste? What would you need to achieve this? Recycling materials can be part of the answer.

Survey the waste at your school.

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Set your school some **goals.**

You goal might be to: Refuse, reduce, reuse and recycle.

Think about how this could be achieved?

You might consider:

* A recycling area
* A compost program linked with a food garden
* Waste bins around the school for recycling.

## Resource 1.9

**Transport**

A proportion of a school’s carbon emissions is linked to transportation. This can include getting to and from school as well as what the school uses and buys. This could include deliveries and the accumulated effect of many kilometres of freight that are required to bring each person or item to the school.

Survey transport related issues at the school.

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Set your school some **goals.**

You goal might be to: Encourage non-fossil fuel transport.

Think about how this could be achieved?

You might consider:

* An education program to encourage walking or cycling.

## Resource 1.10

**Biodiversity**

All schools are part of an ecosystem, many of which have been modified by people. The amount and quality of biodiversity may differ from school to school and place to place, however all schools have the opportunity to take practical action to improve the quality of biodiversity, whether it is within or outside the school grounds.

Survey the biodiversity at the school or in a nearby area.

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Set your school some **goals.**

You goal might be to: Increase the diversity of plants and other animals and organisms.

Think about how this could be achieved?

You might consider:

* Local indigenous gardens
* Shade house and propagation facilities.

## Resource 1.11

**Using things again: our class chart**

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| **Waste** | **New Uses** |
| Food | Use for compost |
| Plastic and paper bags | Take back to the shop for re-use  Recycle and make things |
| Large tin cans | Paint and use as waste bins |
| Paper | Use for Paper Mache modelling  Make note pads |
| Glass bottles and jars | Use for storing things |
| Clothes | Re-use or cut up and make a quilt |
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## Resource 1.12

**My Learning Log Booklet**

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**Name:**..............................................

**Date**:.................................................

**What did I learn today?**

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**What questions does it make me think of?**

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**How well do I understand it?**



**Write about how well you worked today?**

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**Write about what you would do differently if you were to do this activity again?**

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**How did you feel about this unit’s activities?**

