

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

(W.B.Yeats)

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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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# Secondary Teacher ‘How to’ notes

This resource material aims to help teachers and students in secondary 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 students 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, Environmental Education and Geography 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.

Students also have the opportunity to propose new designs, processes and/ or actions to improve the sustainability of the school and reduce its energy and or water consumption; improve its waste management; improve the sustainability of transport options; grow the school’s own food; initiate a worm farm, composting system or carbon forest or improve the amount or quality of biodiversity within or outside the school grounds. They are also encouraged to support their sustainability idea, design, campaign or project for the school with:

* A design or a model of their chosen sustainability idea, design, project, campaign or practice
* Information about how the sustainability features function
* Information about the factors that influenced their project, design, campaign and ideas, including ethical, social and environmental sustainability considerations
* An evaluation of the chosen project, design, campaign, idea and/or practice.

# Implementing the unit in the classroom

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 explorations 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 junior secondary aged students. 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
* Burning fossil fuels for energy can release greenhouse gases and other compounds that create global changes that lead to climate change
* The removal of forests creates global changes that lead to climate change
* Our choice of transport and consumption of resources can increase the production of greenhouse gases
* Greenhouse gas emissions can be cut through increased energy efficiencies, changes in demand and through the adoption of cleaner technologies
* Action is already being taken on local, national and international levels
* Working towards a sustainable future requires planning to meet human needs, together with the responsible use and disposal of resources
* 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, adapt to climate change 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 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 – Secondary 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 create 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:** Junior secondary

## 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, project, campaign or design for improved sustainability and reduced greenhouse gas emissions, and
* Share the idea, project campaign or design 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.

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# Stage 1: Engage with the topic climate change

## Step 1.1 Getting started: explore what ‘climate change’ is

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

**Purpose**

To provide students with opportunities to:

* Gather information about student’s prior knowledge about climate change
* Pool ideas and share with others
* Discuss different view of climate change
* Assist students to organise the ideas they have about climate change
* Develop skills of discussion, negotiation, critical thinking and analysis of written and visual material
* Help set directions for an investigation
* Provide data for assessment purposes.

**Preparation**

You will need:

* Access to the Internet

**Procedure**

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.

Explain to the students that in this unit their challenge is to develop an idea, or project proposal to share with the Principal, school board and others for improved sustainability, adapting to climate change and/or reduced greenhouse gas emissions at the school.

Ask students to consider the following questions:

* What do I know about climate change?
* How and where will we find out more about climate change and my school, my community and my country?
* What does it mean to adapt to climate challenges?
* What does it mean to use resources in a sustainable way?

As a class or in groups explore some facts and information about climate change as is currently understood.

As a class view a range of You Tube videos:

* Climate Animation <http://www.youtube.com/watch?v=wa58h4IJ6Hk>
* Climate Change Everyone’s Business <http://www.youtube.com/watch?v=H6uDiJng-uo>
* Climate Change Singapore <http://www.youtube.com/watch?v=kM02JVIHFLQ>
* Stop Global Warming – Soldiers of the Earth <http://www.youtube.com/watch?v=eyjkS_R1U9s>
* Stop Motion: How to help stop global warming <http://www.youtube.com/watch?v=ReAI4nEupFI>
* Stop global warming with an introduction from Ben Santer <http://youtu.be/x7zMQII8qOo>

**Discussion**

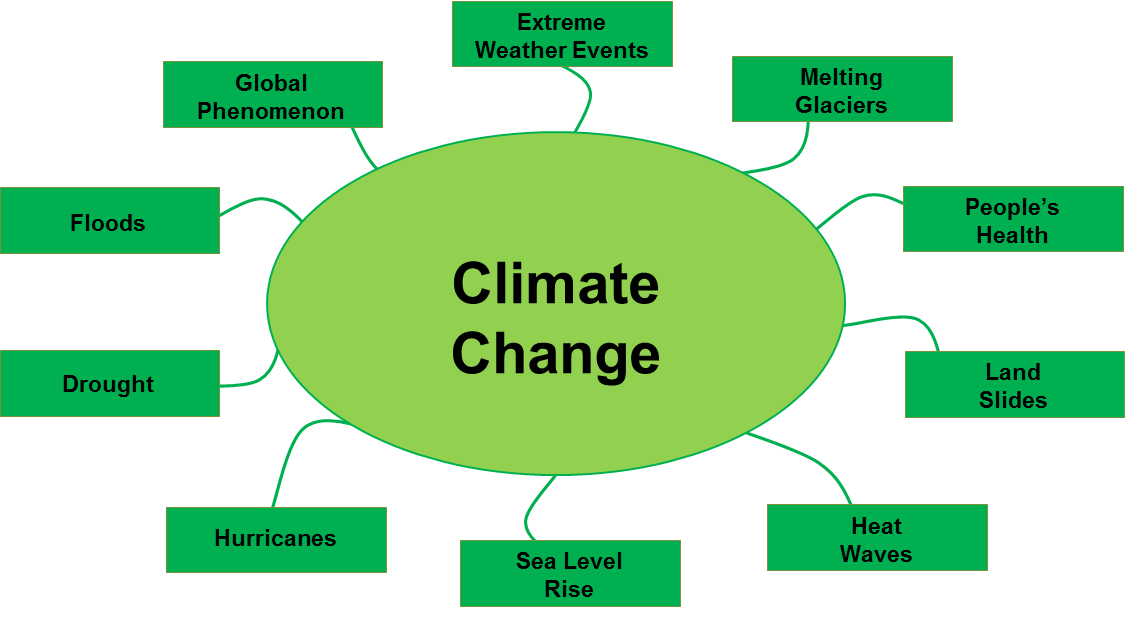
In groups, explore the issues presented and list ideas concerning understandings about climate change.

Ask students to develop a concept map describing what they know about climate change, what it is, what it comprises, what it affects, its potential impacts on living things in a variety of ecosystems, and who and what produces emissions that that can affect the Earth’s climate.

Share with students some facts about climate change as is currently understood.

Use Simple Mapper at <http://simplemapper.org/>

or <http://www.globaleducation.edu.au/verve/_resources/webmap.pdf> to develop a concept map.



**Follow up**

Refer to reference books and websites for support material. See:

* A Student’s Guide to Climate Change <http://www.epa.gov/climatestudents/>
* United Nations Environment Program <http://www.unep.org/climatechange/Introduction.aspx>

**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.

## Step 1.2 Evaluating information

**Suggested Subject Area: Critical Thinking and Literacy**

**Purpose**

To provide students with opportunities to:

* Gather information and analyse it for integrity, balance, visual presentation, clarity, principles of sustainable development
* Record ideas and share with others.

**Preparation**

You will need:

* Copy of the evaluation rubric in Resource 1.1 for all students

**Procedure**

Explain to the students that during this unit of work, they will read and view a range of source materials. Sources could include web sites, YouTube videos, social media sites, media articles, case studies, fact sheets and more. Discuss with the class the importance of using reliable and accurate sources of information.

Ask students to begin using the rubric in their learning journal to record source materials used in the unit and to examine them for integrity, balance, visual presentation, clarity, principles of sustainable development etc. See a page within ***Resource 1.1.***

For example:

| **Title of Source** | **Criteria** | **Not met** | **Adequate** | **Good** | **Exemplary** |
| --- | --- | --- | --- | --- | --- |
|  | The source increases knowledge and understanding climate change and actions to reduce greenhouse gas emissions. |  |  |  |  |
|  | The source has a clear purpose and is well organised. |  |  |  |  |
|  | The source gives a balanced account of the topic |  |  |  |  |
|  | The source accurately reflects the broad range of informed opinion on the topic. |  |  |  |  |
|  | The source includes accurate visual representations. |  |  |  |  |
|  | The source includes sustainable solutions. |  |  |  |  |

# Stage 2: Explore people and places experiencing climate change

## Step 2.1 Investigate environmental factors and climate change in Kiribati, Tuvalu and the Philippines

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Gather information about how the climate is changing and its impact on people and places globally
* Investigate water issues affecting some communities
* Identify and examine the concept of water being collected and stored in a sustainable way
* Examine a composting toilet initiative that enables water use to be reduced
* Develop skills involving viewing, comprehension, research, questioning, reporting and presenting.

**Preparation**

You will need:

* Access to the Internet

**Procedure**

Explain to the students that many places globally are already experiencing the environmental effects of climate change.

View videos and find out more about **Kiribati**, the island nation vulnerable to the effects of climate change and sea-level rise. View two videos about Kiribati and climate change at <http://www.globaleducation.edu.au/resources-gallery/resource-gallery-video.html>

The videos are titled:

* Kiribati and climate change
* Ensure environmental sustainability

Investigate the water scarcity issues experienced in **Tuvalu** and read a case study at <http://www.globaleducation.edu.au/case-studies/drought-in-the-pacific.html>

Find out about how the installation of water tanks and guttering on houses has enabled more water to be collected and stored in a sustainable way. Consider this idea for your school’s buildings.

The case study also describes a composting toilet initiative, one that enables water use and pollution to be reduced and the compost to be used on gardens. Consider these ideas for your school.

**The Philippines** is highly vulnerable to natural disasters and climate change is projected to increase the severity and frequency of many natural disasters globally. Read more about the Philippines’ issue with typhoons (also known as cyclones or hurricanes), heavy rains and winds at <http://www.globaleducation.edu.au/case-studies/the-winds-of-change-philippines.html>

Explore how these three countries are adapting to a changing climate, responding by managing water resources better and discuss the challenges each faces providing fresh water to communities.

**Follow up**

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 who are adapting to the climate challenges being faced. 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 Find out more about communities striving for sustainable futures

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Gather information about how the climate is changing and its impact on people and places globally
* Investigate how education campaigns or awareness raising campaigns can empower people in communities to respond to issues associated with a changing climate
* Examine conservation projects
* Examine water and sanitation systems and how they can improve the health of people
* Develop skills involving viewing, comprehension, research, questioning, reporting and presenting.

**Preparation**

You will need:

* Access to the Internet
* A copy of the evaluation rubric in Resource 1.2 for all students
* Text copy of the case studies from Vietnam, Mekong River and PNG if Internet is not available

**Procedure**

Read more about villagers in the earthquake-prone islands off the coast of Sumatra, Indonesia, who were trained to respond to natural disasters in particular earthquakes, helping prevent the loss of life as education is at the heart of tackling climate change. Consider an education project as part of a proposal to adapt to a changing climate, improve wellbeing and sustainability at your school. See: <http://www.globaleducation.edu.au/case-studies/saving-lives-with-disaster-preparedness.html>

Read about turtle conservation projects in **Vietnam**. See: <http://www.globaleducation.edu.au/case-studies/people-conserving-asian-turtles.html> Your school might be an ideal place to start a conservation project!

Find out about water and sanitation systems and how they have improved the health of people living along the **Mekong River**. See: <http://www.globaleducation.edu.au/case-studies/mekong-delta-water-and-sanitation.html>

Explore how education activities, village meetings, school activities, a weekly radio program, village puppet shows, a community newsletter and teacher training were designed to involve and support villagers to make changes to conserve biodiversity in **Papua New Guinea**. See: <http://www.globaleducation.edu.au/case-studies/conserving-tree-kangaroos.html> Consider how your school could do something similar.

View 60 second UNICEF videos about climate change and environments created by people between the ages of 12 and 20 from around the world. See <http://www.unicef.org/sowc2011/oneminutesjr5.php?id=3#video>

**Discussion**

Research and discuss with a partner the main problems facing a focus country from the selection above who are experiencing a changing climate and discuss how they are being addressed. Report your findings to the rest of the class.

For example: The video ‘One last drop’ created by Tolib from **Tajikistan** features a number of children who are seeking access to safe, clean water. Did you know that changes in rainfall combined with increased potential evaporation are expected to result in reduced runoff across many places? In some cases reductions could be severe.

**Follow up**

The video ‘Baby Trees’ by Dorin from **Romania** described how young people are concerned about deforestation in their country. Did you know that forests play a major part in the carbon cycle? Carbon dioxide is absorbed from the atmosphere during photosynthesis and stored in plants, leaf litter and soil until decomposition returns it to the atmosphere. When the carbon is absorbed faster than it decomposes, the standing stock of forest-carbon increases and the increase is known as ‘biosequestration’.

The video ‘CO2’ by Kamila from **Uzbekistan** shows young people’s concerns about greenhouse gas emissions. Did you know that increases to the amount of carbon dioxide in our atmosphere is causing the world’s climate to change, resulting in extreme weather, higher temperatures, changes in rainfall patterns, rising sea levels, increased bushfire risk, and threats to ecosystems globally?

Consider what the video titled ‘Protect Nature’ by Hanna from **Finland** might be saying?

Use a consequence wheel to examine first, second and third order consequences of any issue that is part of understanding the use of sustainable practices at your school as a way to reduce greenhouse gas emissions that you know about. See ***Resource 1.2***.

**More extension activities**

If interested in reading more about how communities globally are managing forests more sustainably like the students from Romania are hoping for, read a case study at <http://www.globaleducation.edu.au/case-studies/sustainable-living-from-logged-forests-in-papua-new-guinea.html> about how communities in **Papua New Guinea** who are living near logged forests are learning to manage the remaining trees sustainably and earn an ongoing income.

## Step 2.3 Picturing climate change – using a global perspective

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* View and become familiar with some values, viewpoints and different perceptions in our world society
* Become familiar with using the arts as one way of crystallising and communicating issues and values
* Learn from and evaluate pictorial information about how the climate is changing and its impact on people and places globally, and in doing so, to empathise with the people and situations shown
* Develop skills involving viewing, comprehension, research, questioning, reporting and presenting.

**Preparation**

You will need:

* Access to the Internet or colour print outs of the student art work at <http://www.unep.bayer.com/en/International-Children_s-Painting-Competition-18.aspx>

**Procedure**

As a class 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 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’s ideas of actions that can be implemented to adjust to the uncertainties of a changing climate. Discuss these.

# Stage 2b: Explore your school

## Step 2.4 Assessing current school sustainability practices

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Have a focus for the forthcoming experiences in the ‘Explain’ stage of the inquiry
* Evaluate source information
* Discuss, evaluate and make decisions about actions other schools are taking to reduce greenhouse gas emissions, adapt to a changing climate and create sustainable schools.

**Preparation**

You will need:

* Access to the Internet

**Procedure**

Review the sorts of actions schools have undertaken to tackle climate change and create sustainable schools. Evaluate these sources using the rubric in your learning journal.

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

**Discussion**

Encourage students to research and describe the various student projects and initiatives in use within one or more of these programs that encourage schools to reduce greenhouse gas emissions.

**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 2.5 Measure and describe energy and water use, waste issues, transportation and biodiversity in the school

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Discuss, evaluate and make decisions about the school’s ecological footprint
* Discuss things we all can do to reduce greenhouse gas emissions, adapt to a changing climate and improve the school’s ecological footprint
* Develop skills in comprehension, questioning, reporting and presenting.

**Preparation**

You will need:

* A copy of Resource 1.1 for all students

**Procedure**

A school is many things to many people. Think about your school’s ecological footprint – in other words how many greenhouse gas emissions, particularly carbon dioxide are produced from its everyday activities, for example:

* Using energy at school and for transport
* Producing the foods we eat at school and the goods and services used
* Disposing of waste such as paper, food waste, garden waste and packaging.

Describe and summarise your/your team’s understanding of emissions in energy, water, waste, transport and biodiversity contexts at your school in your learning journal. See ***Resource 1.1***.

**Discussion**

Talk with the students about the many things you can do to reduce greenhouse gas emissions and improve the school’s ecological footprint in the classroom. For example:

* Add or remove layers of clothing depending on how hot or cold you are
* Use a hand fan when hot to increase air movement
* Use window blinds (if available) to cut down on the heating effects of the sun
* In warm situations, use natural ventilation to let heat out
* If possible, work away from direct sunlight or sources of radiant heat in summer
* Use natural lighting whenever and wherever possible
* Address the management of outputs that affect climate, for example; energy use, transport choices, purchasing, materials use, materials disposal
* Use and develop the school grounds and surrounding areas to increase sequestration (carbon absorption) by planting trees and attracting native wildlife

Ask students to refer back to the work undertaken earlier. Can they think of others?

**Follow Up**

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

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

## Step 3.1-Research task 1: Assess the school using surveys

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Discuss, evaluate and make decisions about the school’s ecological footprint
* Discuss things schools can do to reduce greenhouse gas emissions, adapt to a changing climate and improve the school’s ecological footprint
* Define and describe a vision of what a sustainable school could look like
* Develop skills in comprehension, questioning, reporting and presenting.

**Preparation**

You will need:

* A copy of Resource 1.1, Resource 1.3 and Resource 1.4 for all students

**Procedure**

Talk with the students about how it will be important to understand the current sustainability situation at the school, as in the later stages of this unit of work they will be developing an idea, project or design to share with others for improved sustainability and reduced greenhouse gas emissions at the school.

Use the survey in ***Resource 1.3*** with the class.

**Discussion**

Consider the following proposition with the class:

‘What do you/ your group think needs to change in the school about sustainable practices and why?’

‘What opportunities are there available to us to adapt to climate challenges?’

Use **Resource 1.4** to assist students to consider what might need to change under the three headings:

Positive: focussing on perceived positive changes

Negative: focussing on perceived negative changes

Interesting: being the issues and questions that arise from the ideas

From the earlier activity, review the ideas and information collected and ask students to record this in their learning journal in **Resource 1.1**. Ask students to consider these questions:

* What do we need to change in our school and why do we need to bring about that change?
* *How might we collect the ideas and voices of students and teachers about ways the school might adapt to a changing climate?*
* Do we need to learn more?

Brainstorm statements.

For example: *To increase sustainability in our school and reduce energy consumption we propose the following...To reduce our school’s carbon footprint we propose the following....To reduce our school’s greenhouse gas emissions we propose the following...*

*In order to adapt when we experience heavy rains in the wet season we propose.....*

*In order to have food available if it floods we propose to....*

**Follow up**

Ask students to define a vision of their sustainable school.

As a class reflect on a compilation of responses from Australian students in Queensland below to a similar question before asking students to craft their vision of what their sustainable classroom or school might look like.

Read aloud or display the following information.

*“I want a classroom …where the roof opens up to the sky, like a BMW convertible, so I can see the clouds, that uses windows with colorful glass which glows in the sunshine, where there are cool breezes [from outside] and limitless supplies of ice cream, that is quiet [other than the birds] while the teacher reads, …and… a classroom I can watch arrive on the back of a truck because I think that is cool!*

*A compilation of responses from Queensland primary school children, aged 9 years old, on how to design a relocatable classroom that highlights their interest in design and passive solutions.*

*‘I want a classroom that gives me the freedom to teach appropriately, with different approaches for different children and classes… but it’s also important that it’s a classroom where the children don’t get too distracted by light, noise and temperature. A teacher*

Source: <http://www.futureproofingschools.com/content/sustainable-school-environments>

Ask students to record their vision in their learning journal in ***Resource 1.1.***

## Step 3.2/Research task 2: Explore options for making a sustainable change at school

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Recall what they know about the school’s ecological footprint
* Discuss things we all can do to reduce greenhouse gas emissions, adapt to climate change and improve the school’s ecological footprint
* Reflect on their own ideas, values and priorities for their school and to consider practical ways in which they can influence change at school
* Develop skills in comprehension, questioning, reporting and presenting.

**Preparation**

You will need:

* A copy of Resource 1.1 for all students
* Access to the Internet

**Procedure**

Discuss with the students how they have researched how other schools and communities have used a variety of actions to improve sustainability practices, adapt to a changing climate and reduce greenhouse gas emissions, and developed their own vision of what a sustainable classroom or school might look like.

Ask them to recall what they know about:

* The school’s sustainability practices
* The school’s adaptation practices
* Factors that can affect a school’s sustainability practices
* Factors that can affect a school’s adaptation practices
* What uses energy and water at the school; what practices produce waste at the school; what types of waste are produced; what transport options are available at the school; and what options there might be to grow local food, trees and plants at the school
* The range of possibilities that could improve the school’s sustainability performance, ability to adapt to change and minimise greenhouse emissions at the school

Ask the students to reflect on the type of actions that could be undertaken to improve the sustainable practices and/or adaptation practices of the school. Display questions like:

* What improvements could be made to the school’s current practices to make them more sustainable?
* What measures could be implemented to adapt to the challenges of climate change?
* Are some solutions more sustainable than others? Why?
* Are some solutions more cost effective for the school? Why?
* What else could we do to reduce greenhouse gas emissions?
* How will we know if the changes we make have been successful in changing people’s behaviours?

Ask students to use their learning journal, to define and document the actions that are most appropriate, sustainable and cost effective for the school to implement. See ***Resource 1.1.***

**Assessment Note**

Student writing or drawing samples in their learning journal about what to possibly change at the school may provide information about student learning.

**Follow up**

Ask students to recall the schools that are factoring sustainability and/or adaptation practices into their management decisions. Ask them to reflect on the case studies they viewed in the earlier part of the unit about how other schools and communities have approached some sustainability and adaptation issues in their schools, villages and places of living and the solutions they developed as a school or community. Encourage students to re-read those sources for information about the resources they needed and used and the constraints (if any) they encountered and needed to factor into their projects for change.

See:

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

Ask students to document those resources in their learning journal and consider the available resources they have for their sustainability idea, campaign, design or project at the school and note any constraints that might also need to be thought through.

Encourage students to use their research and to start generating ‘real ideas’ in their learning journal that they feel could be implemented in the school to improve sustainability and /or adaptation practices.

Use the free online tool to build a case, support your ideas or hypothesis. See <http://educate.intel.com/en/ThinkingTools/ShowingEvidence/TryTheTool/>

Ask students to report to others in the class on how the project ideas researched and initiatives learnt about work and their possible impact or effect on the school and its community.

Also, talk with the 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> 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 3.3 Select ideas and actions

**Suggested Subject Area: Environmental Education, Geography and Literacy**

**Purpose**

To provide students with opportunities to:

* Select ideas and actions to reduce greenhouse gas emissions, adapt to a changing climate and improve the school’s ecological footprint
* Reflect on their own ideas, values and priorities for their school and to consider practical ways in which they can influence change at school
* Identify, evaluate and discuss the environmental, social and economic repercussions of sustainability actions, ideas, campaigns and projects
* Draft an action plan
* Develop skills in comprehension, questioning, reporting and presenting.

**Preparation**

You will need:

* Access to the Internet
* A copy of Resource 1.5 for all students

**Procedure**

Talk with the students about how all ideas and actions, or lack of ideas and action, carry a range of implications. Some can affect places/environment, people/society, economies and policies.

As a class check out Wolfgang Kessling’s ideas as he is building the next World Cup Soccer stadium using sustainable principles. See <http://www.ted.com/talks/lang/en/wolfgang_kessling_how_to_air_condition_outdoor_spaces.html> and discuss how the class might propose the school can create comfortable conditions with passive designs, using only available renewable energy sources like the sun and wind and recovering resources wherever you can at the school.

Ask students to review their earlier thinking...ask them if they have considered:

* Using the sun’s energy to heat and light the school buildings as much as possible
* Making sure people are in a healthy environment where they can get enough fresh air
* Suggesting a worm farm to reuse green waste and food scraps at the school and create soil and liquid fertilisers to use at the school
* Suggesting carbon forest plantings to sequester or absorb carbon dioxide
* Ventilation, like louvers to allow heat to escape
* Recycling bins for paper, food scraps, glass, batteries, mobile phones and aluminium cans
* Establishing food gardens and growing your own food
* Recycling paper and using mud to make mud bricks
* Recycling wood cut offs and making garden beds
* Using natural ventilation to cool classrooms
* Using tree plantings and landscaping to shade buildings
* Blinds for outside and inside windows
* Using skylights to light classrooms

Ask students to decide on the sustainability ideas that they propose be considered at the school to create more sustainable conditions and reduce the school’s greenhouse gas emissions; students can place ideas on a page of their learning journal.

Then, draw a compass in the centre of the class’s board or use ***Resource 1.5*** or access compass images from <https://www.google.com.au/search?q=compass+rose+worksheet&hl=en&prmd=imvns&tbm=isch&tbo=u&source=univ&sa=X&ei=plBzUKa7LMitiAeH4YCYAQ&sqi=2&ved=0CC0QsAQ&biw=1270&bih=544> or <http://www.globaleducation.edu.au/verve/_resources/dev-compassrose.pdf>

Instead of naming the four compass points north, south, east and west use:

* **N**atural environment/ ecological questions
* **S**ocial and cultural questions
* **E**conomic questions
* **W**ho decides? Who benefits? i.e. political questions

**Note:** Diagonal points represent relationships between the four main points. For example, **NE** highlights ideas and questions about how economic considerations might impact on natural environments; **SE** highlights ideas and questions abouteconomic considerations and people’s lives.

Using this ‘compass’ as a class identify the environmental, social, economic and political factors that influence the ways in which the class’s chosen sustainability ideas or designs, technologies or actions might impact or affect the school, its students, budgets and sustainable practices.

Complete this activity for all ideas to really understand all of the implications for proposing their use and implementation at the school.

Alternatively use a flow chart to list a series of events that might happen, sequentially as a result of your sustainability idea or design. Other boxes could be added to show related events. See: <http://www.globaleducation.edu.au/verve/_resources/flow_chart.pdf> for a template to use.

**Follow up**

After looking at the implications of the students’ ideas, ask students to prepare an action plan that defines actions that best meet the criteria for improving sustainable and /or adaptation practices while reducing greenhouse gas emissions at the school. The plan should convey information about:

* Problem areas identified from the surveys and research undertaken.
* Strategies and timeframes.
* Who is responsible?
* Resources needed, and
* Indicators of success.

Ask students to consider a 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 on a project for change

## Step 4.1 Presenting ideas, campaigns, projects or designs

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

**Purpose**

To provide students with opportunities to:

* Make choices and develop the belief that they can be an agent of change and create a more sustainable school, conserving resources, adapting to climate challenges and reducing greenhouse gas emissions
* Understand the meaning of a range of actions to improve sustainability, adapt to climate change and reduce their carbon footprint
* Present their learning through a dedicated presentation
* Learn how to discuss sustainability concepts
* Develop public speaking and leadership skills.

**Preparation**

You will need:

* Access to the students’ ideas, campaign ideas, projects or designs for change

**Procedure**

Talk with the students about the need to bring their information and ideas together for a presentation to the class, so that the main components of how they envisage creating a more sustainable school can be communicated clearly.

Ask students to decide on a way of representing the processes and main messages, data and research collected from their investigations about schools, sustainability, adaptation and reducing greenhouse gas emissions. It could be a poster, a verbal presentation, a flow chart, a video or a drama piece like a role play or skit.

Invite students to make their presentations to the class.

**Discussion**

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

**Follow up**

Create a calendar illustrated with the various ways we can reduce greenhouse gas emissions and tackle climate change for sharing with the community.

Invite local community members to the class to share actions they are taking to be more sustainable and adapt to climate change.

Encourage the broader community to shift towards reducing greenhouse gas emissions, adapting to change and more sustainable practices.

Film or record students’ presentations and share with parents and other classes, or as evidence for assessment purposes.

## 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
* Build contours to harvest water in heavy rains
* 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
* 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 to the school population as forms 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 their projects.

**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, friends and the Principal where students demonstrate their understandings of how to be a more sustainable school, adapt to a changing climate and reduce greenhouse gas emissions that contribute to a changing climate.

Brainstorm how you can make others in the school community aware of your researched proposal, idea, design or campaign while receiving feedback on the school community’s level of awareness of sustainability, adaptation ideas and reducing greenhouse gas emissions.

You could:

* Speak to other classes about your research and share your proposal, idea, design or campaign
* Create a YouTube video and associated blog
* Mount a display inviting others’ viewpoints and ideas
* Use the school newsletter to communicate ideas.

**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 and reflecting

## 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:

* Insight into student’s understandings and attitudes, as well as their perceptions of their own strengths and weaknesses.

**Preparation**

You will need:

* A Learning Log booklet in Resource 1.6.

**Procedure**

Ask students to think back over the unit and evaluate their learning. 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?

Ask students to reflect to see whether they achieved their goal of describing a more sustainable or adaptation practice or designing a sustainable project or idea at the school or in the classroom while reducing greenhouse gas emissions.

**Follow up**

Ask students to identify current difficulties people in their community have to deal with regarding the environment in a changing climate. This might include drought, tidal surges, flooding, high salinity, large populations of insects, weeds etc.

What makes each situation a ‘difficulty’? Invite students to consider whether the situation can be fixed or whether our way of life must change to cope with it. Ask students to provide a possible response to the issue that could reduce its impact.

**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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## Websites (viewed July 2013)

**ACT Government**

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

**Australian Government**

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

<http://www.environment.gov.au/education/publications/curriculum-framework.html>

**Carbo Schools**

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

**Commonwealth of Australia Global Education Website**

<http://www.globaleducation.edu.au/resources-gallery/resource-gallery-video.html>

<http://www.globaleducation.edu.au/verve/_resources/flow_chart.pdf>

<http://www.globaleducation.edu.au/verve/_resources/dev-compassrose.pd>

<http://www.globaleducation.edu.au/verve/_resources/webmap.pdf>

<http://www.globaleducation.edu.au/case-studies/drought-in-the-pacific.html>

<http://www.globaleducation.edu.au/case-studies/the-winds-of-change-philippines.html>

<http://www.globaleducation.edu.au/case-studies/sustainable-living-from-logged-forests-in-papua-new-guinea.html>

<http://www.globaleducation.edu.au/case-studies/saving-lives-with-disaster-preparedness.html>

<http://www.globaleducation.edu.au/case-studies/people-conserving-asian-turtles.html>

<http://www.globaleducation.edu.au/case-studies/mekong-delta-water-and-sanitation.html>

<http://www.globaleducation.edu.au/case-studies/conserving-tree-kangaroos.html>

**Consequence Wheel Templates**

<http://www.google.com.au/search?q=consequence+wheel+template&hl=en&qscrl=1&rlz=1T4ADRA_enAU440AU441&prmd=imvns&tbm=isch&tbo=u&source=univ&sa=X&ei=1-ZkUPHuMZGkiQfCpYDoAg&sqi=2&ved=0CCsQsAQ&biw=1366&bih=589>

**Climate eXchange**

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

**Eco Schools**

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

**Google**

<https://www.google.com.au/search?q=compass+rose+worksheet&hl=en&prmd=imvns&tbm=isch&tbo=u&source=univ&sa=X&ei=plBzUKa7LMitiAeH4YCYAQ&sqi=2&ved=0CC0QsAQ&biw=1270&bih=544>

**Green Flag Schools**

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

**Green School**

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

**Mind Tools Ltd**

<http://www.mindtools.com/pages/article/newTED_00.htm>

**Simple Mapper**

http://simplemapper.org/ **SketchUp**

<http://sketchup.google.com/green>

**UNEP Bayer Partnership 2009 Painting Competition**

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

**UNICEF**

<http://www.unicef.org/sowc2011/oneminutesjr5.php?id=3#video>

**United Nations Environment Program**

<http://www.unep.org/climatechange/Introduction.aspx>

**United States Environmental Protection Authority**

<http://www.epa.gov/climatestudents/>

**University of Melbourne**

<http://www.futureproofingschools.com/content/sustainable-school-environments>

**TED**

<http://www.ted.com/talks/lang/en/wolfgang_kessling_how_to_air_condition_outdoor_spaces.html>

**YouTube**

<http://www.youtube.com/watch?v=wa58h4IJ6Hk>

<http://www.youtube.com/watch?v=H6uDiJng-uo>

<http://www.youtube.com/watch?v=kM02JVIHFLQ>

<http://www.youtube.com/watch?v=eyjkS_R1U9s>

<http://www.youtube.com/watch?v=ReAI4nEupFI>

<http://www.youtube.com/watch?v=H6uDiJng-uo>

# Resource pages

## Resource 1.1

**Student Learning Journal**

This learning journal will guide you through your investigation into climate change and sustainability in your school.

This journal is a record of the work you or your group does.

As a Word document you can add any text, images and pictures to it, tables and graphs, add any links to Internet resources or information.

Student name(s):...........................................................................................................................

Team name:................................................................................................................................

Teacher name:............................................................................................................................

School:.........................................................................................................................................

**Stage 1: Exploring what is known**

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.

**Exploring energy?**

* What do I know about energy?
* How and where will I find out more about energy and my school?
* What does it mean to use energy in a sustainable way?

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**Exploring water?**

* What do I know about water?
* How and where will I find out more about water and my school?
* What does it mean to use water in a sustainable way?

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**Exploring waste?**

* What do I know about waste?
* How and where will I find out more about waste and my school?
* What does it mean to manage waste in a sustainable way?

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**Exploring transport?**

* What do I know about transport?
* How and where will I find out more about transport and my school?
* What does it mean to travel in a sustainable way?

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**Exploring biodiversity?**

* What do I know about biodiversity?
* How and where will I find out more about biodiversity and my school?
* What does it mean to manage biodiversity in a sustainable way?

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**Exploring climate change?**

* What do I know about climate change?
* How and where will I find out more about climate change and my school, my community?
* What does it mean to adapt to a changing climate?

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**The evaluation rubric: a guide to review source materials**

Go through the following steps:

* Evaluate one source at a time
* Examine and discuss each source with a partner
* Use the rubric below for each source, filling in details to support your judgements.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Resource title** | **Criteria** | **Not Met** | **Adequate** | **Good** | **Exemplary** |
|  | The source increases knowledge and understanding climate change and actions to reduce greenhouse gas emissions. |  |  |  |  |
|  | The resource is engaging for students. |  |  |  |  |
|  | The resource has a clear purpose and is well organised. |  |  |  |  |
|  | The resource gives a balanced account of an issue, and accurately reflected the broad range of informed opinion on the subject. |  |  |  |  |
|  | The resource encourages the reader to ask questions. |  |  |  |  |
|  | The visual representations accurately depict the scientific concepts being examined. |  |  |  |  |
|  | The visual representations provide an alternative way for the reader to examine the concepts being discussed in the text. |  |  |  |  |
|  | Captions accompanying each visual representation follow the above criteria. |  |  |  |  |
| **Other Notes** |  |  |  |  |  |

These criteria are based on the official SB&F award criteria by Timothy Gerber. (2009). “Mock SB&F Prize for Science Books Election”.

**Stage 2: Exploring needs to understand what might need to change**

Search for and identify the needs and opportunities at your school to be more sustainable and reduce greenhouse gas emissions.

Or, explore a need or investigate a problem you have already discovered.

Maybe even create a survey to investigate a problem someone brings to you.

However you identify the need or opportunity keep well presented records of all your thoughts, investigations and reasons for decisions. Don’t forget to show where you found your information. There are many suitable methods for recording, such as:

* Photographs
* Drawings
* Notes
* Graphs
* Diagrams
* Recordings
* Computer graphics

Make a plan of action. Give you area of investigation a title:

Consider a plan with the following headings.

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

Remember you should also include acknowledgements to give sources of your information, whether it comes from books, people or places.

Finally start thinking how you will produce a record of this exploration or investigation.

Add other ideas for your plan below!

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**Stage 3: My Vision**

Write about or illustrate your vision of your school as a sustainable school.

Add your vision in words below!

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**Stage 4: My case for what needs to change**

What I think needs to change at our school about how we use energy and why.

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What I think needs to change at our school about how we use water and why.

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What I think needs to change at our school about how we create and dispose of waste and why.

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What I think needs to change at our school about how we use transport options at the school and why.

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What I think needs to change at our school about how we feed the students at school and why.

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What I think needs to change at our school about how we use food scraps and green waste and why.

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What I think needs to change at our school about how we plant and look after our trees and gardens and why.

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Who do we need to talk about these issues and why?

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Do we need to learn more?

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**Stage 5: My draft sustainability action, idea, campaign, design or project**

Once you have identified the change that needs to be made, there can be a number of different options and actions that might produce the change. Describe your idea, campaign, or project...draw your design...or plan a model of it.

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**Stage 6: My resources that I might need**

Consider:

* Who might be available to help you?
* What information might you need?
* Where might you find the information?
* What time is available for the project?
* What finances are available for the project?
* What resources are available for the project? (Consider recycling as much as you can like spare off cuts of wood for a garden bed.)
* What might limit your actions?

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**Stage 7: My big idea**

Describe your sustainability idea, campaign or project in writing, or design and demonstrate your idea with a plan of how you might make a model to demonstrate your idea in lots of detail.

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**Stage 8: My approach**

Consider how you/ your team are going to communicate the idea, campaign, project or design. Will you put up a display? Will you hold a presentation and talk about it?

Add your approach below!

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**Stage 9: My final idea, project, campaign or design**

Document it.

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**Stage 10: My reflections**

Your personal opinions, the decisions you have made and your reasons for them are important. Reflecting on them and recording them will help you to have a better understanding of yourself and the work you have achieved.

Reflect on and answer the following questions:

* How has my/our attitude and behaviour changed as a result of my learning?
* How well did I/we contribute to any group/team learning activities?
* How can I/we apply what I/we have learned to another sustainability issue?

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## Resource 1.2

**Consequence wheel**

Consequence wheels are used to explore wide ranging consequences that can follow from actions, issues or trends in the present. Look at the example below.

***Less greenhouse gas is emitted***

***We don’t burn as much fossil fuel***

***We reduce the amount of energy we use for a task***

***When we conserve energy***

Decide on an issue that is part of understanding the use of sustainable practices at school as a way to reduce greenhouse gas emissions. Place the focus in the centre of the consequence wheel. Then, explore the focus by asking the question “What are the immediate consequences?”

Write the immediate consequences in the inner ring around the main idea. Link each consequence to the main idea with a single line. This indicates that they are first order consequences. Continue exploring second, third and forth order consequences using the outer circles.

Use the four concentric circles below to explore the consequences of an action, issue or trend relevant to the emission of greenhouse gases and/or the sustainable management.

## Resource 1.3

**Survey your school**

The purpose of the quick survey is to gain an understanding of how you think your school rates in thinking and acting sustainably.

Give each item a rating from 1 to 10 of how sustainable your school is. One is ‘poor’ and 10 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 school areas**

**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 1.4

**Plus, minus, interesting**

What do you/ your group think needs to change in the school about sustainable practices and why?

Use the Pluses, Minuses and Interesting/Implications (PMI) chart to evaluate any sustainability practices at the school, compare advantages and disadvantages, and make decisions. In the Pluses column enter all the positive elements, in the Minuses column enter all the negative elements and in the third column enter the issues and questions that arise from the ideas (Interesting) A scoring system can be added to this chart to inform decision-making.

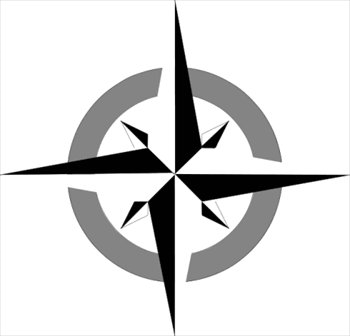
|  |  |  |
| --- | --- | --- |
| **PLUS** | **MINUS** | **INTERESTING** |
|  |  |  |
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## Resource 1.5

**A Compass Rose**

Use the compass rose to examine your chosen sustainability idea or design from a variety of perspectives — the ‘natural’, ‘economic’, ‘social’ and ‘who decides (power)’.

**Natural**



##### **Economic**

##### **Who decides?**

**Social**

## Resource 1.6

**Learning Log Booklet**

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

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

Write about something new you learnt in this unit.

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How did you feel about the activities you undertook?

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What might you do differently if you were to do this again?

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How have your feelings and behaviour changed as a result of your learning?

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How well did you participate in any group/team learning activities?

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How can you make similar changes and improvements in other sustainability areas?

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What questions do you have about the topic at the moment?

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Write about other areas of difficulty that the community has to deal with regarding a changing climate. The following chart might be useful.

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| --- | --- | --- |
| **Difficulty** | **Problem** | **Solution** |
| Drought | Less water to irrigate plants | Use plants that rely on less water |
| Mosquitoes |  |  |
| Salinity |  |  |
| Floods |  |  |
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