

A close-up photograph of a young child with dark, curly hair, wearing a blue shirt, drinking water from their hands. Water is splashing around the child's face and hands. The background is a blurred green field.

All's Well?

Exploring the **world
of water** with upper
primary students

ISBN: 978-0-9872763-0-8

Published by: **One World Centre** (Global Education Project)

© Commonwealth of Australia, 2012

Creative Commons-Non-Com-Share Alike Australia licence, as specified in the Australian Government Open Access and licensing framework 2011

Some rights reserved.

This project was funded by the Australian Government's Overseas Aid Program.

Written and edited by: **Nuella Flynn, Kylie Hosking, Cameron Tero**

Graphic Design by: **www.eddshepherd.com**

Thanks also to: **Alison Bullock, Elaine Lewis, Jenni Morellini, John Neal**

Cover photo: A child in Gamei Jaya Village, Papua, washes his face with clean water. The village is now able to access clean water through a \$3.7 million project funded by Australia that focuses on health, disaster management and clean water and sanitation. Photo adapted from image by Dian Lestariningsih, AusAID.

The views expressed in this publication are not necessarily those of the Global Education Project, or the Australian Government.



Australian Government
AusAID



One World Centre
educating for a just & sustainable world



Contents

Introduction	2
Water images	4
Daily life in an Indian village	6
Water by numbers	8
The global connections game	9
Water vulnerability	10
Safe water	12
Managing the Mekong	14
Graphing the facts	16
Water technology	18
Bottled water on trial	20
A changing landscape: Lake Chad	22
Enough for all	23
Conflict over water	24
Decisions about water	26
Water art	27
Stories of the river	28
Letters for a sustainable future	30
Action ideas	31
Credits and endnotes	32
Australian Curriculum links	back cover

Introduction

The challenges we face

The twenty-first century sees the human community faced with diverse challenges: ongoing conflict, disease risk, environmental degradation, population increases, and many more. Dealing with problems of



Kabul River, Afghanistan
Photo credit: Phil Sparrow

water scarcity, water security, pollution, and wastage, is absolutely vital to enabling human communities to thrive in a way that is socially and environmentally sustainable. Water is crucial to life itself, and an

inability to meet these water-related challenges will mean a troubled future, particularly for those living in poverty.

A brief survey of some relevant statistics and stories can paint a grim picture. One in every six people worldwide doesn't have access to safe drinking water. Diarrhoea, the globe's leading cause of illness and death, is largely caused by poor access to sanitation facilities – unsafe water and lack of water for hygiene. Every day, 2 million tonnes of human waste are disposed of in water courses, and large amounts of industrial waste are dumped untreated into waters where they pollute the usable water supply. Half of the world's wetlands have been lost since 1900, and Himalayan snow and ice, which provide vast amounts of water for agriculture in south Asia, are declining rapidly.¹

But circumstance is not destiny; change is possible. Human endeavours and designs have brought life-giving transformation to communities and the natural world even in seemingly hopeless circumstances throughout history, and continue to do so. Hard times do not pass easily, but neither does hope. Classroom learning experiences that foster understanding of harsh realities, and still look for pathways to a different future, have an enormously positive role to play. The topic of water and the role it has in poverty alleviation provides scope for educators to explore serious challenges, fascinating stories and ideas for positive change.

Bringing the world of water to the classroom

All's Well? is designed to bring the world of water alive in primary classrooms. It aims to give teachers some exciting tools that enable students to gain a broad and deep understanding of the importance of water in a global context. It also aims to foster students' ability to think critically and creatively, to give them the resources and skills to investigate problems and search for solutions, and to motivate students to take positive action in ways that make sense to them. It does lend itself to a themed approach, with teachers being able to bring water as a global issue into a range of learning areas.

The learning experiences in this book are largely aimed at upper primary students, but many can be adapted to suit other age groups. The activities are closely linked to a number of learning areas in the Australian Curriculum, and the matrix (inside the rear cover) maps learning activities to specific content descriptors in the curriculum documents, as well as to the cross-curriculum priorities. Learning activities also relate to the general capabilities from the Australian Curriculum, especially critical and creative thinking, ethical behaviour and intercultural understanding.

Global Education and the five emphases

Global education enables children and young people to participate in shaping a better shared future for the world. The planning for *All's Well?* was built around the five emphases of global education, and has activities that relate to each of these:



Interdependence and globalisation



Identity and cultural diversity



Social justice and human rights



Peace building and conflict resolution



Sustainable futures

These themes provide a basis for global education across a range of topics and learning areas, and enable teachers to think and plan in a broad and systematic way.

Each activity idea is coded to show which of the five learning emphases it relates to. Of course, the inter-relatedness of this material means that there are many connections, but generally they relate to one or two in particular. This coding enables us to see the wide range of approaches to this topic, and to encourage teachers to teach broadly about it.

Global and local, past and future

The activities and resources in this book build global awareness as well as making connections between worldwide issues and local practices. For instance *Bottled water on trial* (p20) examines what might seem like a locally-based issue, but emphasises how the actions of people in one place have ramifications for those in other places — often in ways that neither can imagine. *Stories of the river* (p28) has a very local and historical flavour. However, it brings into focus some important themes in global water awareness, including the role of Indigenous people in caring for land and water resources, the changing nature of resource use, and the consideration of competing interests for land and water. This resource book also highlights a range of ideas, innovations and stories related to water use and poverty alleviation, such as the use of playground equipment to pump water (p19) and the use of sand filters for water purification (p13).

We hope this publication can bring new insights about water and its importance, and the way in which school students can learn and act in ways that have positive impacts on their local and global community.



Girls collecting water, Zimbabwe
Photo credit: Kate Holt, AusAID



Water images

Developing critical thinking skills when viewing images from around the world

Photographs are a fantastic resource for the classroom. They capture students' interest and can be a ready way in to learning about distant places and unfamiliar subjects. Photographs have great power to convey information but can also communicate misinformation. Students need to learn to view photographs critically in order to understand the many images they come across in their lives. They need to be aware that photographs can only ever show a part of what is happening at a particular moment in time and involve choices in what is included and what is left out.

If viewed in an unquestioning way, photos can reinforce stereotypes. In particular, people who experience poverty can be viewed only as victims when they often work hard and are innovative, creative and resourceful. Viewing photographs from different sources can help to avoid a singular view of a place, person or issue. It's also important that individual photos are not taken as representative of a place, country or region.

Below are focus questions, activities and a selection of water images. (Larger versions of these and more are available online at www.globaleducation.edu.au.) Select the photos, activities and focus questions most suited to your purposes.

Focus questions

- ▶ What is happening in this photo?
- ▶ How is water being used in this photo?
- ▶ Do you use water this way?
- ▶ Is any work being done in this photo? Who is doing it?
- ▶ Which photo stands out for you? Why?
- ▶ What feelings do you have when you look at the photo?
- ▶ Does this photo tell the truth?
- ▶ Do you think the people in this photo chose to be in it?
- ▶ Who do you think took this photo?
- ▶ Why do you think they took it?
- ▶ Do you think this photo has been altered?
- ▶ What do you think happened before/after this photo was taken?
- ▶ How might others see this image differently to me?
- ▶ Where could you get more information about the issues raised by this photo?
- ▶ How do photos convey meaning?

Activities

- ▶ **Fact and opinion** — Students divide their thoughts about the photo into what they know for certain and what they have assumed.
- ▶ **Similarities** — Students consider what they might have in common with the person in the photograph. For example they both enjoy swimming, they both need water to drink.
- ▶ **Put yourself in the picture** — Students imagine they are the subject of the photographs. They imagine what they are feeling. They consider if they would be happy for their photo to be used in the way this one is.
- ▶ **Captioning** — Students write a caption to describe a photo. Discuss how the caption can influence how people interpret the photo. Students try to write a caption that would influence the viewer to interpret the photo in a positive way and another in a negative way.
- ▶ **Cropping** — Cover part of a photo and ask students to describe or draw what they think is shown in the covered part. Uncover the photo and discuss the differences between their predictions and the photo. How did only seeing part of the photo change their interpretation of it?
- ▶ **Speech bubbles** — Students are given a copy of a photo and draw a speech bubble for each person in the photo. They imagine what each person might be saying and write it in the bubble.
- ▶ **Story** — Students write a story about what is happening in the photo they have chosen. They think about any stereotypes that could be associated with the photo and try to challenge these in the story.

More information about these photos, including photo credits, is on page 32.





Daily life in an Indian village

A simulation about the importance of water and the difficulties in obtaining it

This lesson introduces students to ideas about what it is like to live in a place where water is not necessarily clean or readily accessible, and promotes discussion about how this may influence life in positive and negative ways. Students are given a list of tasks to complete that represent different

aspects of daily life. All children have the same tasks, but some children have easier access to a water supply than others. This simulation game is designed for groups of 10-30 children, aged 7 years and over. It should take about 45 minutes to an hour to run.

You will need:

- ▶ Two different water sources:
 1. An outside water source that is slightly dirty (such as a large tub of water with impurities), a fair distance away from the main area, or a stream or pond with safe access.
 2. A tap close by your main area.
- ▶ A number of props to use for simulating the tasks – unwashed potatoes, a large cooking pot, wash cloths, wash bowls, small containers for carrying water such as plastic cups or small buckets, toys such as yoyos, balls or skipping ropes, a blackboard and some school books, a pot plant or a garden nearby that can be watered, a rope for a clothes line and pegs.
- ▶ Signs saying: water, kitchen, garden, laundry, and school.
- ▶ A large display copy of the sequence in which students must do the tasks.
- ▶ Small dot stickers for recording when students have completed tasks.
- ▶ Explain to the children that they will be pretending to live in another place that is different to where they live now. They are going to have some tasks to complete. Each task must be completed in order, and each person/group has the same tasks to do. When each task is completed, they will get a sticker — the more tasks completed, the more stickers they will get.
- ▶ Show the list of tasks, explain each task and show the equipment needed:
 1. Collect drinking water: bring water and put it in a bottle or cup.
 2. Prepare food: bring water, wash the potatoes and place them in a large cooking pot.
 3. Wash clothes: bring water, wash a cloth and hang it on the washing line.
 4. Gardening: bring water and water the garden/ plant.
 5. Go to school: choose one of the books and read it to a friend. Write a maths problem on the board for someone else to do.
 6. Play: choose a game from the box and play it for 5 minutes.

Setting up the room:

Set up a number of areas around the room to simulate the places where students will do the tasks:

- ▶ A kitchen where they will wash potatoes and place them in a pot.
- ▶ A laundry where they will wash pieces of cloth and peg them on a line.
- ▶ A school where they will do some learning tasks and then play some simple games.
- ▶ A garden where they can water a plant or plants.

The areas will need to be spread around the room (or outside the classroom) for the game to work well.

How to play:

For small groups, children can play individually, or for larger groups, they can work in teams of two or three.

- ▶ Play the game.

Debriefing

Discussion after the activity is vital to helping students learn the most from their experiences. Make sure you allow plenty of time for these discussions.



Collecting water in Rajasthan, India
Photo credit: Dirk Guinen, AusAID

Suggested questions:

- ▶ How many tasks did children complete?
- ▶ What was it like to have to carry water from far away? What were the good and bad things about it?
- ▶ Who completed the most tasks? Why? Who completed the least tasks? What were some of the difficulties people had?
- ▶ Did you have to wait in line to get water? How did that make you feel? Explain that people collecting water often have to wait a long time. Sometimes the water doesn't flow all the time, or it runs out.
- ▶ What tasks did you miss out on if you didn't finish everything? How would this affect you?
- ▶ What could we learn from people who are in this type of situation?
- ▶ What actions do you think we could take to make this situation better?

Taking it further

To find out more about situations where water collection is an ongoing struggle, direct students to the websites of development agencies such www.aid.gov.au, www.wateraid.org, www.oxfam.org.au, or www.worldvision.org.au.

The Global Education website (www.global-education.edu.au) has case studies and teaching activities under the water heading.

This activity is adapted from TEAR Australia's *Working together in an Indian village* resource package. Further resources that can complement this activity, including the DVD *Life in an Indian Village*, are available from the TEAR Australia website: www.tear.org.au/resources/items/working-together-in-an-indian-village-resource-pack-and-dvd/

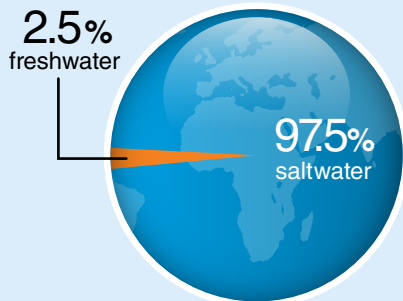


Water by numbers

Facts and statistics for discussion or display

The following statistics were sourced from the UN Water statistics website (www.unwater.org/statistics).

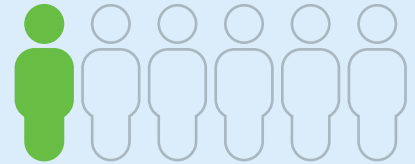
Total world water



Every day, 2 million tonnes of human waste is disposed of in water courses.

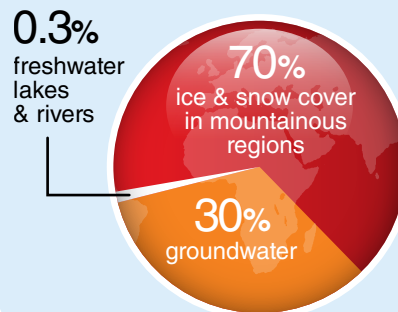
Half of the world's wetlands have been lost since 1990.

Our basic water needs



In a large number of countries, 70% of industrial wastes are dumped untreated into waters where they pollute the usable water supply.

Freshwater resources



One in two people on the planet lives in a city. 27% of the urban population in the developing world do not have piped water in their houses.

Global sanitation (billions)



Globally, diarrhoea is the leading cause of illness and death, and 88% of diarrhoeal deaths are due to unsafe water and a lack of access to sanitation facilities.

Sanitation

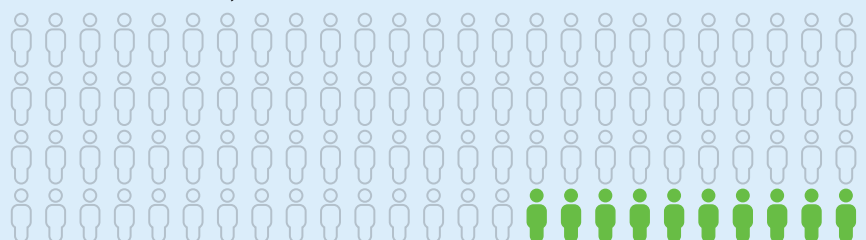
EVERY
20

seconds, a child dies as a result of poor sanitation

Washing hands with soap can reduce the risk of diarrhoeal diseases by up to 47%.

Deaths from Natural Disasters

Between 1991 and 2000, over 655,000 people died in 2,557 natural disasters, of which 90% were water-related events





The global connections game

Helping students connect the local and the global

Activities like manufacturing, agriculture, and use of local resources by visiting tourists can have big impacts on people and the natural environment. Impacts on water use, water quality and water availability are part of this picture too. This activity helps students explore the idea that consumption and human behaviour are not neutral, and often have connections and impacts beyond what we can immediately see.

Activity

1. Have a class brainstorm about how students think water may be affected in a variety of situations. For example, how is water used in manufacturing t-shirts? How is it used in growing food? How about mining gold? How is it used in tourist resorts? (There may be other products or activities you want to add to this list.)
2. To help students discover and think through the variety of implications some common activities or products have, the class will explore some case studies, starting with a 'global connections game'. Shuffle and randomly distribute the following cards to pairs of students assembled in an open space. Ask them to move around the room and talk to other pairs. They should find 3 other cards that could be connected to in a way that tells a story about the impacts of using water, and stand in a group together.

Bali	swimming pool	holiday	salinity
electricity	Fiji	toxic waste	Australia
beef	rice	15,000 L	2,000 L

3. Discuss the connections students have identified and then, if necessary, move students into the groups shown by the rows above, representing the case studies below. The brief case studies only give a small amount of information, but can be a starting point for more research. Discuss them with the class, considering people who are affected in good and bad ways and impacts relating to water quality and availability. Have students suggest actions they could take to respond to these situations.

Tourism

Tourism can have a significant impact on local water resources and people. For example, in Bali, the heavy use of water by tourist resorts (for swimming pools, golf courses and consumption) has caused a big rise in the level of salt water in the ground water supply, and a severe shortage of clean water is a possibility in the coming years.

More information about water and tourism is available at:
[www.unesco.org/water/news/](http://www.unesco.org/water/news/newsletter/155.shtml#know)
[newsletter/155.shtml#know](http://www.unesco.org/water/news/newsletter/155.shtml#know)

Chemicals

Dangerous chemical wastes are a big risk to waterways in many Pacific islands. The toxic chemicals come from equipment used to generate electricity, as well as from pesticides for crops. They are dangerous to humans and to wildlife and are difficult to dispose of in the islands, so the Australian and Pacific Island governments have cooperated to safely dispose of them in Australia.

For more information see:
[www.ghd.com/global/projects/](http://www.ghd.com/global/projects/persistent-organic-pollutants/)
[persistent-organic-pollutants/](http://www.ghd.com/global/projects/persistent-organic-pollutants/)

Beef farming

Agriculture is a vital ingredient in ensuring humanity survives and thrives, and accounts for almost 70% of global water use. Some practices use much more water than others. For example, producing 1kg of beef uses over 15,000 litres of water, while producing a 1kg of rice uses about 2000 litres of water.

More information is available at:
www.waterfootprint.org



Water vulnerability

Role play to foster thinking about global inequality and factors that make people more vulnerable to water shortages

People who are 'water vulnerable' are those who have little or unreliable access to a safe water supply. A person's ability to meet their need for water can be

affected by their gender, health, income, as well as the stability of the government and the strength of the community where they live.

Activity



Collecting water in Kashmir
Photo credit: Giacomo Pirozzi, AusAID

Before the lesson, make a copy of the Water Vulnerability Roles and cut them up into individual cards. You will need a copy of the statements to read aloud and it might be useful to have a large world map for locating countries.

Divide the role cards up amongst the students, individually or in groups. Give them a few minutes to imagine or discuss the daily life of the person whose role they are playing.

Line up the students on one side of a room. (You might want to have each group represented by one student.) Read each of the statements in turn. For each statement, students should think about whether or not it applies to their character. If they think the statement is true for their character, they should take a small step forward. Otherwise they should not move. Stress that

students do not need to know everything about their character. If they are not sure how to answer any of the questions, they should take an educated guess. Uncertainties can be discussed after the exercise.

By the end of the activity, students should be spaced out across the room. This can then be used as a starting point for a discussion on who is the most 'water-vulnerable'. Ask each student (or group) to read out the role they have been given and have a brief discussion about their reasons for stepping forward or not.

What can students infer from the positions of different people? Who has moved the most? Who has moved the least? Can students identify things that made their characters more or less water vulnerable, such as gender, family, having a sustainable livelihood, and community or government support? Has it helped them to understand what being 'water vulnerable' means? What have students learned about water issues around the world?

'This activity is adapted by the publisher from The Big Picture, Spring 2011 with the permission of Oxfam GB, Oxfam House, John Smith Drive, Cowley, Oxford OX4 2JY, UK www.oxfam.org.uk/education. Oxfam GB does not necessarily endorse any text or activities that accompany the materials, nor has it approved the adapted text.'

Taking it further

Students discuss how they can find information about things they were uncertain about in the activity. They research water issues in countries they are unfamiliar with (see page 7 for more suggestions).

Ask students to think about one of the highly

vulnerable characters, and pick one of the statements that affected them. Get them to complete a why-why-why chain to think in more detail about why this character may be vulnerable in this way. (See www.oxfam.org.uk/education/resources/big_picture_spring_2011/?48 for an explanation of a why-why-why chain.)

Water Vulnerability Statements

1. You have access to water in your house.
2. You can get to water whenever you need it.
3. You can expect rain to fall regularly.
4. You have access to water reserves (a back-up source) when there is a lack of rain.
5. You have access to safe drinking water.
6. You have access to hygienic (clean and healthy) toilets.
7. You have access to adequate facilities for washing.
8. Your house has working drains and pipes for waste water.
9. You do not worry that war will force you to move to a place with less water.
10. You do not worry that nearby factories might use up all your water.
11. You do not worry that factories pump toxic waste into nearby rivers or lakes.
12. Your government is committed to supplying your community with water.
13. You can rely on people to fix your water supply if something happens to it.
14. You can rely on people to help you if your home is hit by floods.
15. You do not worry about getting sick from diseases carried by water.

Water Vulnerability Roles

You are... A grandmother living in a refugee camp, in the Democratic Republic of Congo, because of war. There is only one water pump for the whole camp.	You are... A young woman who has fled her home in Sudan because of war and is hiding in the bush. You have to search for food and water.	You are... A disabled man living in a Bolivian village. Your home has running water. However, you have no income or support and you need a wheelchair to get around.
You are... An elderly woman living in a small town in Western Australia. You struggle to turn on taps and wash yourself but you receive support from a part-time carer.	You are... An American businessman living in Indonesia. Your home is in a large city and you are paid a very high salary.	You are... A singer from the Philippines. You grew up in a very poor area but now you are famous throughout Asia.
You are... The Prime Minister of the Solomon Islands.	You are... A doctor in a city in Japan. You are well respected and get a lot of work.	You are... A single teacher living in rural Queensland.
You are... A young child in China. You live in an industrial city, near a large factory that pumps waste into the nearby river.	You are... A banker from Germany. You travel all over the world for your job, always staying in hotels.	You are... A labourer living in a city in Thailand. Your home and parts of your city are sometimes flooded.
You are... A farmer in Bangladesh. The region where you live is suffering from a long drought and it is becoming harder to grow crops.	You are... A 12 year old girl living in Malawi, taken out of school because your mother needs help collecting water and wood. The walk to the well takes almost an hour.	You are... A mother in a small settlement in Papua New Guinea. The land does not produce much food, but your community is working together to grow enough food for everyone.

Safe water

Comparing methods used around the world for treating household water to prevent disease

People without large-scale water treatment facilities may access water from many different sources including groundwater, natural surface water and water collected from rain or air. The quality of this water varies, and some sources may be contaminated with surface runoff, salt,

pollution or disease. The diverse techniques used to treat water at the point of use so that it is safe, reveal the resourcefulness and creativity of people around the world. They apply scientific thinking to solve everyday problems.

Activity

► As a class:

1. List some of the hazards associated with drinking water from an untreated source. Students might suggest *sewage contamination, industrial pollution, animal waste and disease-causing bacteria, parasites and viruses*.
2. Discuss ways hazards could get into the water supply and how this might be prevented. The 'Sources of Contamination' poster from CAWST may provide ideas.²
3. Brainstorm situations where people may need to treat water at the point of use. Students might suggest *camping or hiking, following emergencies/disasters, military operations, communities in remote areas or in places without improved water systems*.

► Techniques for treating water include:

sedimentation, filtration (*membrane, biological filter, ceramic*), **disinfection** (*boiling, chlorine, solar*) and **distillation**.

Have students reproduce a table like the one below with rows for two or three

different techniques to create a summary of how suitable they might be for different purposes.

For information to help fill in the table, visit the resources page of the Centre for Affordable Water and Sanitation Technology website: www.cawst.org/en/resources/pubs

Examples could include boiling, solar disinfection with PET bottles (SODIS), natural coagulants such as prickly pear cactus as used traditionally in Mexico³ or drumstick tree seeds as used in India⁴ to assist with sedimentation and disinfection, and filtration with ceramic pot or bio-sand filtration (BSF) devices.



Sources of contamination
Image credit: CAWST

Treatment technique	Hazards removed	Hazards remaining	How it works (Describe and/or draw)	Cost and ease of use

Bio-sand filters in action

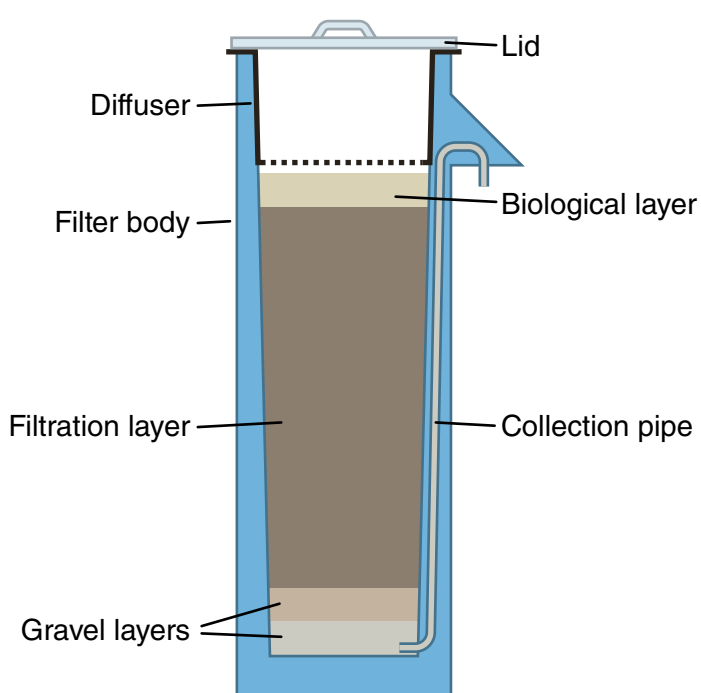
At this school in Faryab province, Afghanistan, a system to provide clean water has been installed. The blue tanks are bio-sand filters. They cost nothing to run and with periodic cleaning they function indefinitely. The water coming from the filter is 99.8% pure. It is collected in yellow bottles and poured into the steel tank for storage and used by the 600 students at the school. Similar systems are used in local homes. The availability of a water filtration system is making a big difference to the lives of this school community.⁵



Photo credit: Phil Sparrow

Operation of a bio-sand filter

Water is poured into the top and passes through a number of layers.



Parts of a bio-sand filter

Diffuser – Water is poured in here and allowed to drip slowly into the system through holes in the base. This prevents disturbing the biological layer.

Biological layer – This layer forms naturally over time and is made up of bacteria and parasites which do not cause disease but which trap and destroy most harmful organisms as water passes through.

Filtration layer – A thick layer of sand which physically traps dirt, dead organisms and other impurities.

Gravel layers – These layers of fine and coarse gravel prevent dirt travelling into the collection pipe.

Collection pipe – The pipe is bent upwards to prevent all the water flowing out of the filter and the system drying out when not being used continually.

Build your own bio-sand filter

Students should examine the picture carefully and can search for further information online. Then they can design their own replica bio-sand filter using a large plastic bottle or other container. Collect some cloudy water from a pond or river and record observations of it before and after it has passed through the filter.

NB. The homemade filter will not have time to develop an adequate biological layer to remove all microorganisms so the water will not be safe to drink.



Photo credit: AusAID

Household water treatment around the world

The man in this picture, Dao Van Manh from Vietnam, has installed a sand filter in his water supply. Household water treatment (HWT) helps combat the 2 million deaths each year related to unsafe water, sanitation and hygiene — most of which occur in children under the age of 5. With more than 1 billion people around the world lacking access to an improved water source and relying instead on polluted rivers and lakes, unsafe wells and piped water supplies, HWT can lead to improvement in water quality and a reduction of diarrhoeal illnesses. AusAID works with partners in a number of countries to foster use of bio-sand filters.



Managing the Mekong

A case study about managing water for a large population

Sustainable resource management is concerned with the rights and quality of life for people now and in the future, and their ability to use resources to meet their needs. The construction and management of water supply systems for densely populated areas can present many challenges

— poor water management can result in ongoing poverty, poor health, insecure employment and lack of access to education. In this activity, students will examine some of these challenges and the positive responses to them, in a case study of the Cuu Long river delta in Vietnam.

Working for change in the Cuu Long river delta in Vietnam

The Mekong River is the 10th longest river in the world and flows from its source in Tibet through China, Burma, Thailand, Laos and Cambodia to Vietnam, where it empties into the South China Sea.



Fishing in Vietnam. Photo credit: Bruce Bailey, AusAID

Its Vietnamese name is Cuu Long which means 'nine dragons'. The fertile soil of the river delta is important for growing food as well as supporting jobs for local people in agriculture, fishing and tourism. The region is densely populated and because roads are limited, travel around the area is usually by boat.

The river also presents many challenges for the people living there. Most water is not suitable for washing or drinking because of bad waste disposal, pollution and salt in the groundwater. Piped water is available only a few hours each day. Floods can also cause major damage to crops, as well as bringing the risk of drowning. Families, particularly women, spend large amounts of time and energy collecting water for basic household needs, paying up to 10 times the usual price for small quantities of drinkable

water. Many people obtain water from unsafe sources such as stagnant ponds and polluted parts of the river. The unsafe water can cause diarrhoea, typhoid, dengue fever, malaria, or skin conditions. People can die from these diseases or become so sick that they can't go to work and school.

The governments of Vietnam and Australia are working together in the Cuu Long Delta Rural Water Supply and Sanitation Project to improve the life and health of 500,000 people living in the area by providing a safe water supply and better sanitation. (Basically, sanitation is somewhere safe and clean to go to the toilet and wash hands.) The project involves local people in designing and constructing water systems that improve drainage, have better and more toilets, and collect waste. Money helps buy equipment and materials, and pays for training local people in water and sanitation technology. Training ensures that the systems can be well maintained after the project is completed. The project aims to supply safe drinking water to most of the urban population, 24 hours a day. Poorer households will be able to obtain safe drinking water close to their homes at an affordable cost, and this means there will be less water-related disease and better opportunities for jobs and education.

Educating people about safe water use and better sanitation is also part of the project, and there is a strong emphasis on women being involved in planning, education and maintenance. The project has helped improve the health of many people in the Cuu Long delta, and has also enabled more employment for women, helped with industries such as fish farming, and promoted tourism.

For more information about this and other water related projects go to: www.globaleducation.edu.au/case-studies/mekong-delta-water-and-sanitation.html

Activity: Case study

1. Provide copies of the case study “Working for change in the Cuu Long River Delta in Vietnam” to students. Ask them to read it and identify any problems that people in the area are facing, as well as some of the responses being made. Brainstorm as a class to create two lists on the board, similar to the following summary.

Summary of problems and responses facing the Cuu Long river delta	
Problems	Responses
Flooding leads to drowning and crop damage	Local people are involved in designing new water systems
Poor waste disposal leads to water pollution	New water systems improve drainage
People obtain their water from unsafe sources	Waste collection systems are put in place
Women and girls spend a lot of time collecting water	Toilets are improved and more are made available
Unsafe water spreads many diseases	Water systems are built to supply water to poorer areas
Sickness keeps people away from work	Safe, affordable drinking water is made available close to where people live
Some families pay up to 10 times the usual price for small amounts of drinkable water	Governments cooperate to provide money for equipment, materials and education
Large population requiring water	Local people are trained to maintain the water and sanitation technology
Piped water is only available for a few hours a day	Education about safe water and sanitation is provided
Children are unable to go to school when they're sick	Women are involved in planning, education and maintenance

2. Provide small groups of students with 20 small cards in 2 different colours and have them write or draw something to represent problems on one colour and responses on the other. Groups should then match up response cards with problems which they address and arrange them on a large piece of paper, drawing arrows to show the positive impacts. Responses may address more than one problem so multiple arrows may be drawn.

Activity: A town on the Mekong

Students are to plan a town for people living on the Mekong River, considering the physical, social and economic needs of the community. They will use their mapping skills to sketch an aerial view of the town on a large sheet of paper, including essential services such as education, water and sanitation, agriculture, transport and housing.

Debriefing

As a class, discuss what support a local community might find useful to work towards sustainable management of their water resources.



Image credit: Jane Tero



Graphing the facts

Turning real numbers about clean water projects into useful graphs

This activity is based on data about the use of water filtering processes in Cambodia. It enables students to construct and compare different data displays, discuss applications to various situations, and also to learn more about the importance of clean water and ensuring the usefulness of development approaches.

Clean water is vital in ensuring good health. Research about **household filtering systems** in Cambodia showed that they clean **95%** of the disease-carrying bacteria in water, and therefore reduced the incidence of diarrhoea in communities by nearly 50%. Cambodia has the largest number and concentrations of **bio-sand filters** in the world. Other types of household water treatment are also used, such as **ceramic filters**.

Activity: Turning the tables into graphs

Give students some background information about the importance of clean water, and the use of household filtering systems. Using the following tables, students can construct graphs to represent information about water filters and their impact. The first table (data set A) lends itself to a line graph that plots two different sets of related information on the same two axes. The second table (data set B) lends itself to a side-by-side column graph.

Data set A: Long-term use of different types of water filters

Many people in Cambodia need to use simple filtering systems in their homes to make their water safer to drink. Two types of filters commonly used are the ceramic filter and the bio-sand filter. One important factor in the filtering program being successful is how long the filters last, or how long people keep using them for. The table below shows percentages of people who are still using the filters in the years after they were first introduced, contrasting the length of use of the two different types.

Percentage of people using filters in the years after they were introduced. Data is shown for two different types of filters		
	Ceramic filter	Bio-sand filter
1st year - January	100%	100%
1st year - July	85%	92%
2nd year - January	81%	91%
2nd year - July	51%	90%
3rd year - January	50%	90%
3rd year - July	30%	90%
4th year - January	18%	89%
4th year - July	12%	89%
5th year - January	10%	87%
5th year - July	10%	86%

Data source: University of California, School of Public Health

It's important to point out to students that the table above represents only one particular situation and doesn't give a complete picture of the usefulness of different types of filters. The reduction in ceramic filter use was largely due to breakages, and some agencies have made changes to promote longevity. Also, use of ceramic filters can have other benefits such as the development of local ceramic industries. For more information about bio-sand filters, see the *Safe water* activity on page 12.

Ceramic water filter

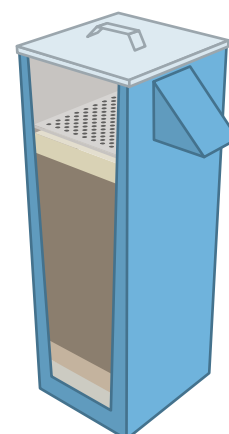
As water passes through the ceramic walls, disease-causing bacteria are trapped within the small spaces. Some filters have a lining that also helps kill bacteria.



Photo credit: AIDG

Bio-sand filter

The water passes through a number of layers within the filters, trapping and killing the disease-causing bacteria.



Data set B: The effect of bio-sand filters on cases of diarrhoea

A development agency did some research to see what difference using bio-sand water filters made to the health of the families who were using them. Households were visited each month and data was recorded about numbers of cases of diarrhoea among people using the water filters, as well as those who weren't.

Reported cases of diarrhoea: <i>Comparison between families using and not using bio-sand filters</i>		
Month	Cases of diarrhoea among families using bio-sand water filters	Cases of diarrhoea among families not using the filters
1	242	408
2	244	301
3	200	361
4	179	333
5	160	320

Data source: University of California, School of Public Health



The difference in water quality before and after water has been passed through a bio-sand filter
Photo credit: CAWST

Some follow-up questions:

About using graphs:

- ▶ What conclusions can be drawn from the graphs that you've made?
- ▶ What data did you need to be able to create the graphs?
- ▶ What types of graphs did you use to convey the data clearly? Why?
- ▶ What type of data about water use in Cambodia might be displayed in a different type of graph, such as in a pie chart, or a horizontal bar graph?

About water use and filtration in Cambodia:

- ▶ What did this activity tell you about water use in Cambodia?
- ▶ Why is it important to collect this type of data about using household filters? Who would be interested in this research?
- ▶ Are there some further things that you would like to find out?

More information

The following websites provide interesting information about water filtering and development projects:

The Centre for Affordable Water and Sanitation Technology: www.cawst.org/en/resources/biosand-filter

Potters for Peace: www.pottersforpeace.org



Water technology

Comparing the social and environmental sustainability of technologies for accessing and using water

Sustainable technologies carry out their functions without adversely affecting people and environments now or in the future. They also help solve everyday problems and provide many additional benefits to the community. Sustainability checklists can be used to help people design or assess water technologies and to help consumers make wise choices.

Activity — What's sustainability anyway?

Hand out and discuss some definitions of 'sustainability' with your students. Emphasise that things which are sustainable protect both environments and people, and not just one or the other.

<i>meeting the needs of the present without compromising the ability of future generations to meet their own needs</i> World Commission on Environment & Development (1983)	<i>the protection and replenishment of our natural environment and the development of just, diverse societies supported by effective economies</i> Australian Sustainable Schools Initiative – WA (2010)
<i>sustainability aims to reduce our ecological footprint while simultaneously supporting a quality of life that is valued – the 'liveability' of our society</i> The Australian Curriculum (2011)	<i>enough for all forever</i> Australian Sustainable Schools Initiative – Qld (2010)

How sustainable is it?

For each water technology on the facing page, ask students to work through the 'Sustainable Technology Checklist' and decide how strongly each statement applies. They can then rank each one from most to least sustainable and share the results as a class.

Sustainable Technology Checklist <i>The more strongly you can agree with the statement, the more sustainable the technology.</i>				
People	Yes	Partly	No	Not sure
There is an important need for it				
It is affordable (cheap enough to buy)				
It is durable (lasts a long time)				
It can be maintained and repaired by the user if needed				
It can help provide ongoing local job opportunities				
It is fair to women and men				
It can be safely manufactured				
It supports basic human rights (to food, education, fair pay)				
It has a positive impact on people's daily lives				
Environments				
Plants and animals are protected				
Damage to air, water and soil is prevented during manufacture, use and disposal				
It relies on only renewable energy sources (e.g. solar, wind)				
It only uses essential materials				
Materials it uses are available close by instead of travelling a long way				

Water technology — How sustainable is it?

These technologies help people to access, use and conserve water.



Photo credit: mediamolecule

Accessing groundwater: PlayPump

Much time can be spent pumping water from wells and groundwater sources. This job is often carried out by women and girls and prevents them from taking part in other activities such as education and enterprise (buying and selling goods).

These children are having fun using a PlayPump. Find out more about PlayPumps at: www.waterforpeople.org www.playpumps.co.za

Human waste: Composting toilet

Getting rid of human waste safely often relies on the use of a lot of water to flush toilets. This can be a problem in places where water is not readily available or must be conserved carefully. The composting toilet requires no water in its operation.

The people in this photo are posing in front of their composting toilet in Makili village on Atauro Island, Timor Leste which helps to prevent disease without the need for water, a scarce commodity on the island. Find out more about how composting toilets and other sanitation technologies work at: www.wateraid.org/uk/what_we_do/sustainable_technologies/technology_notes/248.asp



Photo credit: Alison Bullock

Raising awareness about water wastage: Poor Little Fish sink

People with easy access to water may use more water than is really



Photo credit: hahatango

needed to carry out everyday tasks. This sink was designed to raise awareness about water wastage by reminding people that using (and wasting) water can have a negative impact on animals and the environment.

This person is demonstrating the use of a fishbowl sink. The designer, Yan Lu, says "Poor Little Fish basin offers an emotional way to persuade consumers to think about saving water, by making consumption tangible." Find out how the fishbowl sink works (are you really washing your hands with 'fishy' water?): www.yanlu.com

Harvesting rainwater: Household water tanks

Water that falls on buildings can be diverted to a rainwater storage tank and used for various purposes. This is important for people who are not connected to a water supply system, but is also useful for people with easy access to a water supply to reduce their reliance on water storage dams.

This photo shows men from Mauboro, Papua New Guinea constructing scaffolding for a concrete water tank which will supply water to 19 houses. Find out about a range of rainwater harvesting solutions around the world. The following sources might be helpful: www.wateraid.org/documents/plugin_documents/rainwater_harvesting.pdf and www.rainharvesting.com.au/rainwater-knowledge-centre/rainwater-harvesting



Photo credit: Dean Sewell

Bottled water on trial

An inquiry into the level of sustainability of the bottled water trade, considering the connections between water bottled in one place and consumed in another

Show students a bottle of water and ask how many students drink bottled water. Tell them that they will be putting bottled water on trial in an international court. Discuss what this means and ask why anybody would want to take bottled water to court. The charge for this case will be: Causing damage to people and the environment.

Activity

Divide the class into a prosecution team and a defence team. (The defence team may well have the more difficult job so consider this in team selection.) They will have time to research and make their case, as well as consider the arguments the other team might make and how they will counter these. Remind students that no matter what their personal beliefs about bottled water, they must argue their side of the case during the trial. During the trial team members may play the role of a prosecution or defence lawyer or a witness.



Research

Have pairs or small groups from each team researching some of the following issues in preparation for making their case. Students should consider the global impact of bottled water, as well as the local.

								
Cost	Use in natural disasters	Image	Waste & recycling	Employment	Oil use in production	Advertising	Transport & emissions	Convenience

Students can use the following resources as starting points for their research:

www.storyofstuff.org/bottledwater

www.ourbottledwater.org.au

www.gotap.com.au

www.bottledwater.org.au

www.chrisjordan.com/gallery/rtn/#plastic--bottles

www.cbc.ca/news/world/story/2006/03/16/water--poor--060316.html

www.stopcorporateabuse.org/water--campaign

www.friendsjournal.org/bottled--water

The trial

Have students conduct the trial based on these procedures. Following their prosecution and defence roles, students will need to act as the jury and consider both sides of the case, not just the one they argued.

- ▶ Judge opens case (Teacher may act as the judge)
- ▶ Defendant pleads guilty or not guilty (For the purposes of this activity the defendant needs to plead not guilty)
- ▶ Prosecution opening address
- ▶ Prosecution witnesses
 1. Examination by prosecution
 2. Cross-examination by defence
 3. Re-examination by prosecution
- ▶ Defence opening address
- ▶ Defence witnesses
 1. Repeat examination
- ▶ Defence closing address
- ▶ Prosecution closing address
- ▶ Judge instructs jury
- ▶ Jury deliberates and comes to a verdict.
(Unanimous, or majority if this isn't possible)



For more information on court procedures see: www.lawsocietywa.asn.au/education--resources#GMLER

Discussion

After the trial ask students if they agreed with what they were arguing? Was it difficult to come to a decision? What did they learn? What surprised them? Also, ask students what they thought of the places they got their information from. Did they evaluate the information they used, considering who had written it and their motivation for doing so? Were there any issues of bias?

Taking it further

The day after the trial ask students to write a short piece reflecting on their initial view of bottled water, the trial and their view now. Students should also consider if what they have learned in the activity will have any impact on their actions in the future. Will it change their consumption habits? Would they like to take any other actions such as: telling other people what they have found; investigating if bottled water is for sale in the school; campaigning for more drinking fountains; fundraising for clean water infrastructure where it is needed?



A changing landscape: Lake Chad

Online geography tools to explore the impacts of a drying climate on people and environments

Lake Chad lies across the borders between Chad, Niger, Nigeria and Cameroon. Its shores are home to over 20 million people and it is one of the most important water sources in Africa.⁶ It is used for irrigation, fishing, and as a habitat for millions of migratory birds crossing the Sahara Desert from Asia and Europe. Changes in the lake since the 1960s have contributed to a lack of water for local people, livestock deaths and crop failures, collapsed fishing industries, soil salinity and increasing poverty in the region. These changes are attributed to factors including water being used for irrigation, local deforestation and desertification leading to less rainfall, as well as global climate change.⁷

Activity

The following can be conducted by individual students, small groups or as a demonstration for the class.

Google Earth lets you view satellite imagery, maps, terrain and other geographical information.

- ▶ Download and open Google Earth from www.google.com, and 'fly' to Lake Chad by typing it in the search window. Zoom in and click the 'Historical Imagery' button along the top menu. Use the slider and arrows to advance the timeline, observing changes to the surface area of the lake from 1963 to the present day. What change is noticed?
- ▶ Turn on the Global Awareness layer — UNEP: Atlas of Our Changing Environment (You may also watch 'Lake Chad: UNEP & Google Earth highlights environmental change'⁸ on YouTube for a demonstration). Click the UNEP symbol near Lake Chad to read about changes to the lake over the last 50 years and follow links to the UNEP Atlas website for further information and images. How many people rely on Lake Chad for their livelihood? Compare this with the population of Australia.
- ▶ Click on photo icons in Google Earth and watch 'Saving Lake Chad'⁹ on YouTube to find examples of ways people use Lake Chad, and the plants and animals that inhabit the area. How are the changes to Lake Chad affecting the lives of the people who rely on it and the local environment?
- ▶ Examine the country boundaries around Lake Chad. What do you notice? How could this make looking after the water resources of Lake Chad easier and/or more difficult?

MAPfrappe compares the size of areas by letting you create outlines and overlay them on another part of the world.

- ▶ Go to www.mapfrappe.com and drag or search the reference map till Lake Chad is visible. The 'Map' view shows a different lake size to the water visible in blue in the 'Satellite' view. Click to create outlines for both views to compare both current and past sizes of Lake Chad.
- ▶ Drag or use the search window in the comparison map to compare the outline of Lake Chad with other lakes (such as the Aral Sea in Uzbekistan/Kazakhstan or Lake Eyre in central Australia), or with your local area.

Free Map Tools' Area Calculator calculates the enclosed area of any space that you outline on the map.

- ▶ Go to www.freemaptools.com/area-calculator.htm and search for Lake Chad. Zoom in on the map view and click to create an outline of the water area. Record the area.
- ▶ Switch to satellite view and click to create another outline of the visible water cover. Record the area, using the same units, and calculate the difference in the lake's surface area.

Alternatively, overlay the following image or aerial photographs¹⁰ with graph paper and use it to estimate the percentage decrease in the area of Lake Chad from 1963 to 2007.





Enough for all

Designing and constructing a fair water system that meets a diversity of needs



Photo credit: Agrilife Today

Water distribution and irrigation systems can be used to provide water to crops, overcome periods of low rainfall, provide drinking water, supply industries and remove waste. Competing demands for water can lead to conflict. Therefore engineers who design water systems should take different opinions into account.

Activity *Class discussion: Thinking about fairness*

Irrigation systems are a way of sharing and distributing water from a single source. How might an engineer need to consider being fair to people and the environment when designing and building an irrigation system? What do you think engineers would have to find out about before starting construction?

Often many people rely on one water source for different needs. What if one

farmer diverted a river to use on crops and that prevented people downstream from receiving any river water? Or if water was diverted to a very profitable industry using so much water that small local farmers might not get enough to support their livelihood. What would be fair? How do people decide which use of water is the most important?

Irrigation systems need to be built carefully and maintained regularly. In communities where water must be shared who should be responsible for planning, designing, repairing and paying for irrigation systems?

Read the following scenario with your students:



Photo credit: JobyOne

Anchord and Peppard are two communities separated by the 'Nannul River', their only major fresh water supply. Anchord, with its abundant farming land, uses water from the river to irrigate crops which are the major food source for the local people. Peppard relies on the water for industry, which provides employment to the majority of workers. Each community is operating its own network of pumping stations, pipes and irrigation systems. Tensions have been growing for some time because a period of drought has seen the river flow slowing, the water level dropping and the river ecosystem suffering from the rate of water usage. There have been an increasing number of protests claiming that each community is taking more than its fair share of water.

After a series of meetings it was decided to build a new shared water system. Independent engineers have been employed to design more efficient irrigation systems on farms in Anchord, to reduce waste. They are also able to recommend methods for recycled water to be used by industry in Peppard, reducing its demand for fresh water. On this basis it has been decided to allocate 2/3 of the pumped water from the river to Anchord and 1/3 of the pumped water to Peppard. Some water will stay in the river to protect the local river ecosystem and this will be monitored by both communities.

Group work: Design and construction

Students are to work in teams to design, build and test a water distribution system in order to simulate sharing water from Nannul River. The irrigation system must deliver 1 litre of water a minimum distance of 1/2 metre and water should be allocated as decided by the communities (2/3 for Anchord and 1/3 for Peppard). Students must find a way to show that this water allocation has been met. Students should use everyday and reclaimed items from around the school and their homes. You may wish to consider setting a budget for this project with teams required to 'buy' collected materials from the teacher. Students should test their system and give themselves and other teams a rating based on team cooperation, fairly sharing the water, durability of the system, and choice of materials.

Conflict over water

Exploring the differing perspectives in conflicts over water

There can be many factors at the heart of conflicts over water: unequal distribution; increasing population; inefficient use; pollution; rising cost of access; and disputes over the right to use a water resource. Students will consider two scenarios of conflict over water resources and develop their appreciation for the importance of understanding other points of view in order to resolve a conflict.

Activity

- ▶ Distribute either scenario A, which relates to a conflict in Kenya or B, which relates to an Australian conflict, to groups of 3 students. Explain that the scenarios are simplified descriptions of more complex real life situations. Allow time to discuss the cause(s) of the conflict described.
- ▶ Provide student groups with a large piece of paper and ask them to list 3 people/groups with an interest in this conflict and then divide the paper into sections with a space for each.
- ▶ Each student should then take on the role of one person/group and record in their section how they might respond to the following points and report back:
 1. How would they feel about the issue?
 2. What might they say to explain their viewpoint?
 3. Are there any points they might agree on with others?
 4. What outcome(s) would be in the best interest of this person/group?
- ▶ After sharing their responses, have students list all the possible outcomes which were proposed on the back of the paper. For each outcome the students should discuss:
 1. Who would these outcomes benefit and/or disadvantage? How?
 2. What compromises could be offered for those who are disadvantaged?
 3. What final solutions could the group you represent offer?
 4. If time permits, have student groups repeat the exercise with the other scenario.



Water pollution in Daru, PNG
Photo credit: Dave Vosen, AusAID

Class discussion

- ▶ Was it possible to reach a consensus (a point where everyone agrees)? If so, how? If not, why not?
- ▶ What were some of your feelings in this lesson and why do you think you felt that way?
- ▶ Think of a time you changed your viewpoint about an issue. Write a sentence that begins “I used to think..., but now I...” Describe what influenced you to change your view.

Taking it further

Discuss how differing viewpoints or priorities might lead to conflict in the following situations.

- ▶ Damming a river to generate hydroelectricity
- ▶ Tapping into an underground supply of water for a new mine
- ▶ Installing a more efficient pump for a community's water supply
- ▶ Cleaning up a polluted water source

Find media reports which describe water conflicts and identify the range of viewpoints presented.

Scenario A – Nairobi, Kenya: Water supply conflict¹¹



Photo credit: Chrissy Olson

In Nairobi, the capital city of Kenya, the government water supply ends at the edge of one of Africa's largest slums*, Kibera. Private water sellers have built a network of cheap plastic pipes and tanks through the slum but they often leak and become contaminated with sewage. The million people who live in Kibera end up paying much more than those in other Nairobi neighbourhoods for water, and it makes them sick.

Women and children are usually responsible for water collection. On a good day this can take an hour while on a bad day the price skyrockets and they can spend all day looking for a seller with

water, lining up and carrying the water home again. When water is not available for sale, people must rely on open water sources which are often polluted. Slum residents are angry that the government has not improved their water supply situation.

When riots broke out in Kibera following government elections in Kenya, some of the first targets for vandalism were tanks owned by water sellers who had been selling at very high prices for years. Riots in the slums are usually described in the media as random acts of violence or a cultural clash between different groups. But this kind of violence often breaks out in places where people lack access to basic services like water and may not have many options for getting the attention of their government.

**Slums are unofficial settlements where residents do not own their land and often lack access to water, sanitation, electricity and other services.*

Scenario B – River development: Cultural significance conflict¹²

An area of land on the Swan River in Perth, Western Australia was rented to a building company by the local government. The site was considered a good business opportunity for property developers, but claims by different groups of the area's cultural, spiritual and historical significance to them led to a long dispute about what should happen at the site.

Since Western Australia was colonised this site had been used for many purposes including a timber and flour mill, a leather tannery and an ice works before a brewery was built and operated for nearly one-hundred years. The buildings remaining at the site were considered an important record of the area's use since colonisation because of their beauty, design type and historical value. People wanting to preserve this heritage value called for a modest development, preserving the late Victorian architecture of the buildings.



Photo credit: Matt Madd

To the Indigenous people of Australia, rivers have special cultural and spiritual significance. The brewery was built on a site known as Goonininup, considered sacred by the local Noongar people as it is believed to be a resting place for their Dreamtime ancestor, the Waugal, who formed the Swan River. This history has been passed on for thousands of years through storytelling, art, dance and ceremony. The area was used for many generations by the Noongar people as a site for camping and initiation ceremonies and for fishing and trade. A protest was mounted by people who wanted to recognise the Indigenous history of the site by demolishing the old buildings of the brewery and returning the area to nature as a riverside extension of the nearby parklands.



Decisions about water

Examining consequences for women and girls

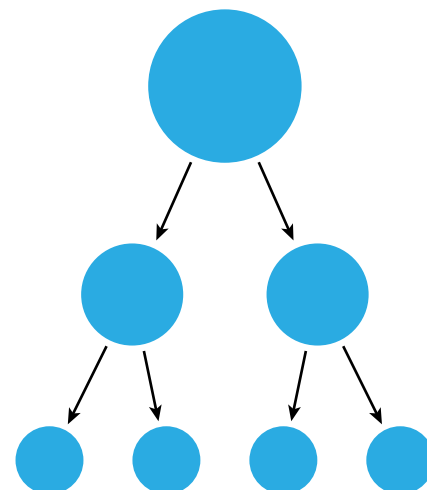
Around the world women usually have responsibility for managing household water needed for drinking, preparing and growing food, caring for animals, personal hygiene, caring for the sick, cleaning, washing and getting rid of waste. They are often very knowledgeable at finding, storing and using water but in some communities women are overlooked when it comes to planning and improving water management.¹³ Key areas in which women are affected adversely by water choices when compared to men include access to water supply and sanitation, land rights and water for production, participation in decision making, the impacts of pricing and rights to water, and recovery from water conflicts, disasters and emergencies.¹⁴

Activity

Students using a Consequences Chart¹⁵ start with a problem, suggest possible choices or solutions, and then write the probable flow-on consequences of each solution. These consequences may be short term or long term, and positive or negative. The following scenarios are real examples of how women around the world have been affected by decisions relating to water use. Have students read each one and complete a chart showing consequences for:

- ▶ the changes that were made.
- ▶ what may have happened if a different action, or no action, was taken.

Share results as a class and then list all the ways better water access, education and participation for women and girls can benefit communities around the world.



Access to water supply: Mabuia, Angola¹⁶

Growing up in the Angolan village of Mabuia, Fatima had to spend up to four hours collecting water each day from the river. It was a dangerous trek. One year, seven of Fatima's friends were attacked by crocodiles. An even bigger danger was the polluted water which spread disease. When Fatima was not sick she had to spend many hours each week caring for sick brothers and sisters and, when she grew older, for her own sick children. Eventually, a pipeline was laid from the river to the community at Mabuia. Toilets, washbasins, taps and showers were built and a filtering system was installed to ensure every drop of water was drinkable. As a result, diarrhoea rates and child deaths dropped dramatically and many girls (who no longer had to spend hours every day carrying water) entered school for the first time. A community water and sanitation committee now maintains the system and provides hygiene education.

Participation in decision making: Hoto, Pakistan¹⁷

In Hoto village, Pakistan, where women follow a strict form of purdah*, an action research team went to help the village improve its water management. For a year the men would not give permission to the research team to meet the women of the village. Eventually, the women were able to participate in a joint meeting, and they suggested a new water tank be built on unused land to provide water to the non-functioning public standpipes. The women's solution, which was far more cost-effective, was chosen over the men's proposal. After this initial success, women became active participants in decision making, and significant changes have been made in their lives through hygiene education. Most significant has been the demand for education for their daughters with the opening of a new girls' school in Hoto. Traditional leaders have been impressed by the results of the project and the same approach is now taken in other villages.

**From a Persian word meaning 'curtain', purdah is a cultural practice of concealing women from men and may include physical separation and the use of a burqa or niqab.*



Water art

Viewing and displaying artworks to communicate ideas about water conservation and justice

There are many examples of art being used to increase environmental awareness and highlight issues relating to water such as pollution, conservation, drought, clean water access and climate change. Artists can use their work to spread persuasive messages and inspire positive actions.



Photo credit: Camps International

Papa Pata Pata (Father Flip Flop) This whale shark sculpture is made of thongs collected along the Kenyan coast by young people working with local artists on a school expedition. It calls attention to the threat of rubbish and drift nets to whale sharks and their watery environment.¹⁸

Ice Art To raise awareness of the human cost of climate change, Oxfam asked three Danish artists to create ice sculptures of a Maasai family that would melt during the December 2009 United Nations Climate Change Conference in Copenhagen.¹⁹



Photo credit: Oxfam International

Activity

Viewing water art

Find images of artworks being used to promote positive action for people and environments such as the two examples above. Teachers may wish to collect these before the lesson or have each student find an example to contribute. Examine the pieces and discuss:

- ▶ How do they make you feel?
- ▶ Do they encourage a way of thinking about an issue or situation?
- ▶ How can art raise awareness of water issues and other problems in the world?
- ▶ Why would art be a useful tool for inspiring people to change?
- ▶ Think about one important water issue and how you would represent it in an artwork. Share ideas as a class.

Planning an art exhibition

Students are to act as curators for an exhibition presenting artworks about water issues from around the world at a gallery or museum. The exhibition aims to raise awareness and inspire action for people or environments. They should consider the following points as they plan their exhibition and then present an overview to the class:

- ▶ What overall theme would your exhibit have?
- ▶ What art would you include? (Include a picture and short description of why it was included)
- ▶ How would you arrange the works and where would they be displayed? (Include a map or diagram)
- ▶ How would it be made available to a wide range of people?
- ▶ How will the exhibit help inspire follow-up action from people who view it?

Art as enviro-activism

Artist Mark McGowan turned on a tap in a London gallery in 2006 and announced that it would flow for a year, wasting 15 million litres of water, but the gallery turned off the tap after being warned their water supply would be cut off. The controversial artist says that creating outrage is how he gets his message across. According to John Carson, head of fine art at Central St Martins College of Art and Design, "McGowan's projects are set up to reach a level of outrage whereby it has to stop."²⁰



Stories of the river

Researching a local water course

This activity aims to increase student knowledge of the history of water resources in their local area, including understanding about how Indigenous people have used and cared for water resources over time.

Students of all ages and backgrounds in Australia should be given the opportunity to appreciate the Indigenous heritage of their local area and their nation. Indigenous cultures across Australia are diverse — there are for example, currently 145 Indigenous languages spoken across Australia (at the time of settlement, there were estimated to have been at least 250)²¹. Also, histories, experiences and aspirations vary, and so the use of **local resources**, and making contact with **local Indigenous people and organisations** is important in developing a genuine understanding of Indigenous histories, practices and cultures.

Working collaboratively with local Indigenous people to plan and teach units of work, or at least for those people to provide input into class discussions, can deepen students' understanding of culture, and be an invaluable source of knowledge about the past and the present.

“Aboriginal people have successfully managed their land for at least 40,000 years. This land provides the primary resources for clothes, food, building materials and all the other items needed for a healthy sustainable life. Traditional Aboriginal land use practices in Australia use resources in such a way that they are renewed and not exhausted. Aboriginal land use practices rely on an excellent knowledge of the area including the complex diversity of plants and animals found there as well as the physical environment and ecology in which they live. There is a deep understanding of season changes which effect all land use activities including food collection, mobility and ceremonial practices.” **Extract from NSW HSC syllabus**

Research project

Identify a local watercourse, and undertake a small class research project about its changes in use over time. Choosing a reasonably substantial river or creek will enable you to find a larger amount of information.

Some or all of the questions below can act as focus questions for the project.

- ▶ What is the local Indigenous language for your area? What names have been used for the river in the local language? (There may be a few different names for different areas)
- ▶ Before colonisation, what was the river used for?
- ▶ What have people used the river for at different times since then?
- ▶ What impact have different activities had on the quality of the river?
- ▶ What practices have been undertaken to care for the river in recent years? How have local Indigenous people been involved in planning and care?

It may be helpful to show some examples of how the history of a watercourse has been traced by others. For instance, *My Place* by Nadia Wheatley and Donna Rawlins traces the history of one place, working back in 10 year intervals, to show the changes in land use and children's lives that occur in what is now suburban Sydney. One of the changes the book tracks is a watercourse that is now a canal, and used to be a river. It shows changes over time, including pollution, changes in surrounding land use, and the role of people caring for and using the river, including its use by Indigenous people before European colonisation. Another book, *You and me Murrawee* by Kerri Hashmi and Felicity Marshall, tells stories of a local river through the eyes of a young girl, highlighting the connections and contrasts between a girl from the present and one from the past.

Finding information

Where you find information will of course depend on your location. It's crucial to remember that local histories are diverse, and therefore use of local resources is important. The list below outlines some sources which students in Perth could use to research a nearby section of the Swan and Canning rivers, also known as the *Derbyl Yerrigan* or the *Beeliar*.

- ▶ Local and state libraries
- ▶ Physical displays at parks by the river
- ▶ Kaartdijin Noongar – Sharing Noongar Culture
www.noongarculture.org.au
- ▶ Rivers of WA website
www.rowa.org.au
- ▶ Swan River Trust Indigenous history
www.swanrivertrust.wa.gov.au/riverpark/culture
- ▶ South West Aboriginal Land and Sea Council
www.noongar.org.au

Similar types of resources will be found for many other local areas around Australia.



Photo credit: Cameron Tero

Presentation

Research can be presented in a number of ways – a series of small group posters that are displayed in the classroom, school foyer or local library, a film documentary, a written report, or a class talk. This is also a good opportunity to invite a local Indigenous person to your school to speak about past and present use and care of the river.

Bridgetown District High School – A case study in investigating a local water course

Bridgetown is in the southwest of WA and the District High School caters for students aged 5 to 15. In 2009, a group of students and teachers undertook a research project to learn more about the history and health of the catchment area of their local river – the Blackwood. Central to the research was a five-day road trip which enabled the group of students to investigate a variety of places and hear stories from around the catchment, and included a major emphasis on finding out about Indigenous stories past and present. Their travels and research enabled the students to learn about creation stories of the river, significant past and modern day Indigenous art movements, the history of land clearing and habitat loss, native species that were at risk, river contamination, and movements to address these challenges. The students discovered a great deal about the inter-relatedness of the river catchment – how practices in one place have consequences for the river and the surrounding communities in another, and how one river system can flow through a diverse area which is rich in natural and human heritage.

They shared their story with other school groups in the south west, and also attended the Youth River Health Conference in Canberra — presenting their findings to students from across Australia and New Zealand, as well as delivering letters to Government ministers outlining the findings from their research and making some requests about support for sustainability projects.

“We are all tourists just passing through this catchment, but how will we leave it? How will the future generations remember us?” — Student, Bridgetown District High School



Letters for a sustainable future

Ideas and tips for writing letters that make a difference



Photo credit: Jim Homes, AusAID

Letter writing is a tangible and realistic way that students can take action about an important issue. It is also very relevant to the content of the Australian Curriculum: English, where students are required to write persuasive and informative texts.

Below are some suggestions for letter writing activities for students which relate to the global issue of water, including suggestions for topics to write about, who to write to, and how to go about it.

Advice about writing to community leaders

- ▶ Use formal language, but you are expressing an opinion so it's OK to include phrases like 'I feel' and 'I want to see'
- ▶ Use your own words
- ▶ Show that you know something about the issue you're writing about
- ▶ Be polite; being rude or offensive will harm your cause
- ▶ Be concise; write briefly and clearly
- ▶ Offer practical solutions
- ▶ Ask the recipient to take some action
- ▶ Ask for a response to your letter

What to write about

- ▶ The health of a local water course (see page 28)
- ▶ Drawing attention to the needs of children who don't have access to safe water (see page 6, page 10)
- ▶ Asking questions about how Australia is assisting communities overseas (see page 14, page 16)
- ▶ The use of bottled water (see page 20)

Who to write to

It depends to a large extent on what you're writing about, so make sure you spend time choosing the correct agency or person to write to about the particular issue. Here are some examples of who you could write to:

- ▶ The local council — about a local water course
- ▶ To a company director — about bottled water
- ▶ To a member of state parliament — about laws which discourage pollution and waste
- ▶ To a member of federal parliament — about foreign aid and development projects in the international community

Extra tips for teachers

- ▶ If you have a number of letters being sent to one place or person, attach a short introductory letter explaining that students have been studying this particular issue and have written letters as one practical way of taking action
- ▶ Tell them that your students would really appreciate some type of response
- ▶ A follow-up phone call may also encourage a response

Action ideas

10 ways that schools and students can take practical action

#1.

Register your school to be a part of World Water Day.

www.worldwaterday.org

#2.

Install a water tank, at school or at home.

#3.

Write a letter to your local member of parliament, explaining that you have been learning about global water issues, and you would like to know about what plans the government has to support water security in the places that need it the most.

#4. Take the *50 litre challenge* – a pledge to live on 50 litres of water each day for a week. Read more here:

<http://waterfortheages.org/>

#5.

Use a stainless steel water bottle which you can use and refill many times over.

#6.

Find out more about what others are doing and how to get involved in water actions by visiting:

www.actnow.org.au

#8.

Lower your *water footprint* by eating less meat and buying less new clothing.

#7.

Invite the local mayor or councillors into the class and interview them about how the local council plans to promote water conservation.

#9.

Form a partnership with another school overseas, so students can swap ideas and stories about water use.

#10.

Run a class fundraising event to raise money for a water and sanitation project in a particular place where access to clean water is needed.

Credit and endnotes

Further information about photos from Water Images activity (page 5)

Photo	Caption	Credit
1	Sekong, Lao PDR, 2009. A woman carries heavy buckets of water back from a standpipe	Jim Holmes for AusAID
2	Siem Reap, Cambodia, 2002. Water Festival, Siem Reap	Pigalle
3	Kampala, Uganda, 2009. A woman washes her clothes near an open drain at her home in Kampala. The Australian Aid Program announced in June 2010 that it is supporting Plan Australia to deliver projects to improve safe drinking water and access to basic sanitation and hygiene services, including in Uganda	Kate Holt/Africa Practice/AusAID
4	Lao PDR, 2001. A girl waters her family vegetable plot close to the river. These very productive gardens add vital nutrition to an otherwise river-based diet and are promoted by CARE, an AusAid partner. Taoun Village, Laman District, near Sekong, Lao PDR	Jim Holmes for AusAID.
5	Indonesia, 2009. Australia is supporting Indonesia to improve access to clean water, which is essential for economic growth and poverty reduction	AusAID
6	Gulu, Uganda, 2011. "Strength" is an understatement, when the jerrycan weighs more than 40 pounds. Beatrice carries it with an elegance and grace that would make you think she was carrying a pillow and not 20 L of water...	The Advocacy Project
7	Sudan, 2011. Women and children of Abu Shouk Internally Displaced Persons (IDP) Camp in El Fasher, North Darfur, use Water Rollers for easily and efficiently carrying water. With its large drum capacity (usually 75 litres), the device frees women and children from having to spend a large portion of every day dedicated to collecting water for their households. The UN has distributed some 3,000 such rollers across Darfur	United Nations Photo/Albert Gonzalez Farran
8	Mumbai, India, 2008. Public laundry	Dirk Guinan for AusAID
9	Ethiopia, 2011. Oxfam trucked clean water into Harshin district earlier this year, where poor rains left local water sources dry	Oxfam East Africa
10	India, 2008. Water seller	Dirk Guinan for AusAID
11	Vietnam, 2006. Health centre water tower	AusAID
12	Solomon Islands, 2009. Peter Bua has a shower at one of the new water points installed by Oxfam in the hills above Nusa Barooka village	Rob Maccoll for AusAID
13	Vietnam, 2011. War veteran, UXO (Unexploded ordinance) survivor, and bonsai expert, Mrs Phon, watering her bonsais	The Advocacy Project
14	Indonesia, 2007. A farmer brings in a netful of Acehnese Monodon prawns, considered among the best in the world. Australia helped rebuild Aceh's peak aquaculture prawn hatchery, which provides support and training for farmers and has helped lead to increased yields	International Finance Corporation/AusAID
15	Kenya, 2009. Due to lack of formal infrastructure, cycling water vendors transport 20 litre containers for the primary form of water distribution within the largest slum in Nairobi, home to approximately 800,000 residents	Engineering at Cambridge
16	Haiti, 2007. Haitian children get washed up outdoors	United Nations Photo/Logan Abassi
17	Indonesia, 2009. Children from a village near the Mantangai River in Central Kalimantan. Forest fires, illegal logging and degrading land along this river can have severe consequences for the livelihoods and health of local communities	Josh Estey for AusAID

Endnotes

1. United Nations Water. *Statistics: Graphs & Maps* (2011) www.unwater.org/statistics.html
2. Center for Affordable Water and Sanitation Technology. *Water, Hygiene and Sanitation Posters* (2011) www.cawst.org/en/resources/pubs/education-materials/category/1-cawst-poster-series
3. Talking Plants. *Purifying water with prickly pear goo* (2010) www.talkingplants.blogspot.com/2010/05/purifying-water-with-prickly-pear-goo.html
4. Miracle Trees Foundation. *Moringa water purification* (2011) www.miracletrees.org/moringa_water_purification.html
5. Itinerant and Indigent. *Images from villages in Faryab* (2011) www.itinerantindigent.wordpress.com/2011/09/22/images-from-villages-in-faryab/
6. United Nations Environment Programme. *Lake Chad* (2008) na.unep.net/atlas/webatlas.php?id=58
7. United Nations Environment Programme. *Vital Water Graphics* (2008) www.unep.org/dewa/vitalwater/article116.html
8. You Tube. *Lake Chad* (2009) www.youtube.com/watch?v=JXW29zsr6xg
9. You Tube. *Saving Lake Chad* (2009) www.youtube.com/watch?v=Rs6uJULQrkM
10. NASA Earth Observatory. *Africa's disappearing lake* (2001) earthobservatory.nasa.gov/IOTD/view.php?id=1240
11. Mmaji: Designing liberation technologies. *Water in Kibera* (2011) mmaji.wordpress.com/water/
12. Rivers of WA. *Indigenous links* (2011) www.rowa.org.au/indigenous.php
13. Wateraid. *Women and Wateraid* (2006) www.wateraid.org/documents/women_and_wateraid_2006.pdf
14. United Nations Water. *Gender, water and sanitation* (2006) www.unwater.org/downloads/unwpolbrief230606.pdf
15. Global Education. *Consequences chart* (2008) www.globaleducation.edu.au/resources-gallery/resource-gallery-templates.html
16. Teach Unicef. *Water and sanitation* (2011) www.teachunicef.org/explore/topic/water-and-sanitation
17. IRC. *Influencing gender policy* (2007) www2.irc.nl/manage/manuals/cases/hoto.html
18. Treehugger. *Kenyan artists turn dangerous, polluting materials into inspiring depictions of wildlife* (2009) www.treehugger.com/files/2009/10/kenyan-artists-inspiring-depictions-wildlife.php
19. Oxfam America. *Melting ice sculptures evoke changing climate's impact on Maasai* (2009) <http://firstperson.oxfamamerica.org/index.php/tag/copenhagen/page/3/>
20. Treehugger. *Art as enviro-activism* (2006) www.treehugger.com/files/2006/01/art_as_enviroac_1.php
21. Australian Government Department of Foreign Affairs and Trade. *Indigenous Languages* (2008) www.dfat.gov.au/facts/Indigenous_languages.html

Australian Curriculum links

Lesson	Learning Areas	CCP's
Water images	English: Year 6 & 7 (ACELY1708; ACELA1764) <ul style="list-style-type: none"> Literacy: Texts in context – representing ideas and events in different ways Language: Expressing and developing ideas – analyse how point of view is generated in visual texts by means of choices 	AEA S
Daily life in an Indian village	Geography: Year 6* <ul style="list-style-type: none"> Geographical Knowledge and Understanding: Space — unequal distribution of health across the globe 	AEA S
The global connections game	Geography: Years 5 & 6 <ul style="list-style-type: none"> Geographical Knowledge and Understanding: Environment — human activities can change environments and places over time Geographical Knowledge and Understanding: Place — places are connected locally, regionally and globally, through the movement of goods, people and ideas 	S
Water vulnerability	Geography: Year 6 & 7 <ul style="list-style-type: none"> Geographical Knowledge and Understanding: Space — unequal distribution of health and wealth across the globe Geographical Knowledge and Understanding — differences and similarities in the ways that communities manage or adapt to the chosen environmental hazard 	AEA
Safe water	Science: Years 5, 6 & 7 (ACSHEE083; ACSHE100; ACSHE120) <ul style="list-style-type: none"> Science as a Human Endeavour: Use and influence of science — solutions to contemporary issues 	AEA S
Managing the Mekong	Geography: Year 5 <ul style="list-style-type: none"> Geographical Knowledge and Understanding: Place — communities manage places and make decisions about the provision of services for their people 	AEA S
Graphing the facts	Mathematics: Years 5 & 6 (ACMSP119; ACMSP120; ACMSP147) <ul style="list-style-type: none"> Statistics and Probability: Data representation and interpretation — constructing and interpreting a range of data displays 	AEA
Water technology	Design and Technology	S
Bottled water on trial	Geography: Year 6 <ul style="list-style-type: none"> Geographical Knowledge and Understanding: Place — places are connected locally, regionally and globally, through the movement of goods, people and ideas 	S
A changing landscape: Lake Chad	Mathematics: Year 6 (ACMMG137) <ul style="list-style-type: none"> Measurement and Geometry: Using units of measurement — solve problems involving the comparison of areas using appropriate units 	S
Enough for all	Science: Year 7 (ACSHE121) <ul style="list-style-type: none"> Science as a Human Endeavour: Use and influence of science — science understanding influences the development of resource management practices Design and Technology	S AEA
Conflict over water	Geography: Year 7 <ul style="list-style-type: none"> Geographical Knowledge and Understanding — water is a difficult resource to manage, is an essential but shared resource, has competing uses and is highly variable over space and time 	S
Decisions about water	English: Year 7 (ACELT1619) <ul style="list-style-type: none"> Literature: Literature and context — explore ideas about issues drawn from different social and cultural contexts 	S
Water art	The Arts	S
Stories of the river	History: Year 6 (ACHHK116; ACHHS119; ACHHS120; ACHHS121; ACHHS122) <ul style="list-style-type: none"> Historical Skills: Historical questions and research; Analysis and use of sources Historical Knowledge and Understanding: Australia as a nation — contributions of Aboriginal people and Torres Strait Islanders 	ATSI S
Letters for a sustainable future	English: Year 6 (ACELA1525; ACELY1714) <ul style="list-style-type: none"> Language: Expressing and developing ideas — how language can express meaning and opinion Literacy: Creating texts — draft and publish informative and persuasive texts 	S

The curriculum links listed here are the ones most closely related to each lesson, but the list is not exhaustive and there may be links to other learning areas, strands and year levels which are also fulfilled by these lesson ideas. To find out more about each of the content descriptors written in this table, enter the code in the search window at: www.australiancurriculum.edu.au.

*Many of the activities in this resource have clear links to the Australian Curriculum: Geography for a number of year levels, but as the curriculum was only available in draft form at the time of going to print, content description codes were unavailable. Curriculum for other learning areas such as Design and Technology and The Arts will be available from 2012-2013.

All's Well?

Exploring the world of water with upper primary students

All's Well? is a resource book for upper primary teachers — packed with lesson ideas and resources to bring the world of water to the classroom.

All's Well? helps students become aware of the tough challenges the human community faces regarding water, as well as looking at possibilities for hope and change. This book gives teachers the tools to bring rich global learning experiences to the classroom — increasing knowledge, fostering new skills, questioning values, and encouraging realistic action for positive global citizenship.