

School Name:	Unit title: Up a Dry Gully	KLA(s): SOSE	Year level(s): 8 & 9	Duration of unit: Approx 10 Lessons supplied by SEQ Water
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Rationale

The ‘Up a Dry Gully’ Schools program is to create and implement an education program that can be adopted by schools and integrated with the curriculum to promote the water story, from catch, collect, store and treat in SEQ.

It is important to implement this program to ensure that the community of SEQ has a great awareness, acceptance and understanding of water in our region. This project is very topical given the developments in the water system in SEQ and the drought challenge we have been facing more recently. The knowledge, skills, perspectives and values this education resource offers will enhance the development of the children and their relationship with Assets of SEQ water.

This unit is designed to engage all learners in a variety of research and hands on activities related to water conservation and sourcing in the SEQ region. Each learning experience is inclusive of all types of learners. Teachers are encouraged to mould the activities to best suit the students needs.

The ‘Up a Dry Gully’ Schools program is designed to run each year. It is a school-based competition that encourages continued interest in SEQ water, its assets and its role within the community.

Identify Curriculum - SOSE

Ways of Working	Knowledge & Understanding
<p><i>Students are able to:</i></p> <ul style="list-style-type: none"> • Research & analyse data, information and evidence from primary and secondary sources • Draw conclusions and make decisions supported by interpretations of data, information and evidence • Reflect of different perspectives, and recognise and evaluate the influence of values and beliefs in relationship to social justice, the democratic process, sustainability and peace • Reflect on learning, apply new understandings and justify future applications 	<p>Place & Space</p> <ul style="list-style-type: none"> • Interrelationships between human activity and environments result in particular patterns of land and resource use, and can cause environmental problems. • Governments and communities need to balance economic, social, political and environmental factors through sustainable development, consumption and production. <p>Culture and Identity</p> <ul style="list-style-type: none"> • Cultural diversity in Australia is influenced by public opinion, media portrayals, government policies and the impacts of globalisation. • Cultural research involves following protocols and acting sensitively.
Context for Learning	ICT Application
	Inquiring with ICTs

This century, many countries including Australia will face the dilemma of how to balance human needs with the requirements of the natural systems that are vital to sustain life on earth. Water is one of these essential needs.

For students who are going to continuously face these challenges in their lifetimes, it is important that they explore the sources of this vital resource and the ramifications for the environment of industry and agriculture's use of water, as well as their own personal use.

It is also very important since Australia is one of the driest inhabited continents on earth that students look for sources of water outside those supplied by our climate.

- Plan, conduct and refine advanced searches, and select appropriate sources of digital information in response to research questions
- Classify, organise, analyse and interpret data and information from a variety of sources to respond to inquiries, or to identify new paths for inquiry

Creating with ICTs

- Develop plans for innovative and creative responses, processes and simple systems
- Express and creatively represent ideas, information and thinking in innovative ways
- Creatively and effectively document and present their planning, thinking and learning, using a combination of media.

Communicating with ICTs

- Present an individual or group identity in communication
- Select and apply a variety of ICTs to exchange and interpret messages and meanings.

Develop Assessment

Make Judgements

Develop Assessment			Make Judgements	
Type of Assessment	What will be assessed	When it will be assessed	Purpose of Assessment	Assessable Elements

Lesson One

Water – Where does it come from?

Student Objectives

By the end of this lesson students will:

- Have a greater understanding of how the natural process of the water cycle functions (some of this should be prior knowledge)
- Have a sound understanding of the concepts of Evaporation, Condensation, Precipitation, Collection and Runoff, as well as a basic understanding of the concepts of infiltration and transpiration.
- Understand how humans can impact this natural process.

The Lesson:

INTRODUCTION:

Begin the unit with a class discussion about water. Discuss the importance of water (using various props) and get students to guess how much water is in each of the items selected. Examples include:

- Apple (85 % water)
- Water melon (90% water)
- Mango (82% water)
- Human (approx 60% water)

Discussion Points

Why is water so important?

How does the water cycle work?

Teacher to guide the discussion and possibly illustrate on the board, aiming for the students to demonstrate the water cycle key principles of

- Evaporation,
- Transpiration
- Condensation,
- Precipitation (Rain, hail, sleet and snow)
- Infiltration
- Runoff
- Stormwater
- Catchment

Students will then need to ensure they have a copy of this in their notes.

Discussion Points

Where does water come from?

How do clouds form?

What are some different types of cloud common to Qld?

What is the difference between storm water and wastewater? What makes them different?

Extension

How does Acid Rain form? (Emphasis the human influence impacting this natural process)

What impact does Acid Rain have on our environment?

Activity

Write a children's' story/cartoon strip that shows the journey of a single water drop as it goes through the main parts of the water cycle

Optional Science Activity

Design an experiment that illustrates how the concepts of evaporation / condensation / precipitation takes place.

Discussion Point

Where is the water stored?

Get the students to guess how much water is stored in our lakes and rivers, oceans and under the ground.

- 0.6 % Lakes & rivers
- 1.6 % Underground (groundwater)
- 97 % Oceans
- 2.4 % Frozen stores (polar caps, snow and glaciers)

Activity

Use a blank map of the world to demonstrate how much water is stored in our oceans. Students can then label the oceans with the correct percentage figures and label the land with the other labels.

Extension

Name the seven different continents on the map using a colour code system.

Write a paragraph to explain how global warming would influence the water storage at the poles.

Conclusion

Revisit the key concept words in the form of a quick revision quiz for students to demonstrate the understanding of the water cycle.

Resources

For the Teacher

- www.apps.southeastwater.com.au have an excellent education program, including a water cycle game.
- Master copy of world map
- Master copy of Word Find activity
- Master copy of Cross Word Activity

For the students

- Blank world map
- Word find activity
- Cross word activity

Cross Curricular Opportunities

Mathematics

Graphing activity using the statistical data given about global water storage.

Science - experiment

Evaporation and Condensation practical opportunity.

Lesson Two – Storing our water... Introduction to the Hinge Dam

Student Objectives

By the end of this lesson, students will:

- Have a greater understanding for the need to conserve water.
- Have an understanding of how humans catch water and store it for future use and treat it so that it is safe for use.
- Demonstrate an understanding of the relationship between the Hinze Dam and the Gold Coast community
- Understand how dams are used to mitigate flooding.

The Lesson:

INTRODUCTION

Students begin to think about drought and population growth in the Queensland and how they are affecting water supply to the Gold Coast area

Discussion points

Where does our water supply come from?

Why do we need to conserve water?

What is the community doing at the moment to conserve water?

What will happen in ten years time if there is no water left?

DAMS AND RESERVOIRS

Teacher to guide a discussion about different ways of holding water in the ground. Students are encouraged to talk about dams they have seen; from reservoirs to giant dams build for the purpose of controlling flooding or to generate hydroelectric powers.

Discussion points

What are the major dams in SEQ?

How does a dam differ from a lake or river?

HINZE DAM

Teacher to ask students if anyone knows where the water for the Gold Coast comes from.

Discussion points

Where is the Hinze dam?

What is the purpose of the Hinze Dam?

How does the water get from the Dam to the Tap?

What treatment process happens between these places?

Activity

Looking at a map of the Gold Coast areas, students are to locate the Hinze Dam and mark out the area they think it would be capable of supplying water to. Teacher to demonstrate on a larger map the areas supported by the Hinze Dam and encourage discussion about its importance.

Optional Activity

Types of Dams

In groups of 3, students to spend 20 mins online researching the different types of dams that can be built to store water and produce a mind-map. Then come back to the group and report on what they have found. Use their information to identify the construction type of the Hinze Dam.

RAISING THE WALL

Students are to think about why the dam is currently closed for construction.

Discussion points

What are they doing to the Hinze Dam?

Why does the dam wall have to be raised? Students to consider the influence of tourism, drought, growing population and evaporation in their discussion.)

What does raising the dam wall involve? (This can be covered in a later lesson if needed)

How will this affect our water supply?

ACTIVITY:

Students are given a map of the Hinze Dam and are to label the following features:

- Intake tower
- Dam wall
- Spillway
- Saddle Dam
- Direction of water flow

Students are then to draw (under teacher direction) the changes that are to be made to the dam wall.

CONCLUSION

Students are asked to keep a log of personal activities to conserve water around the home and at school in order to help support the Hinze Dam project. This is to be continued throughout the duration of the unit.

Resources

For the Teacher

- Labelled Map of a Dam
- Information about the SEQ Water Dams, in particular the Hinze Dam
- Unit information for Teacher

For the students

- Map of the Gold Coast Area
- Unlabelled Map of the Hinze Dam
- Water Conservation Log
- Computer access

Cross Curricular Opportunities

Visual Art:

Students design a poster outlining their understanding of the Hinze Dam and how they can help the project through water conservation for display at school.

Lesson Three
Wivenhoe Dam - Largest water source for SEQ.

Student Objectives

By the end of this lesson students will:

- Have an understanding of the location of the largest water supplies in SEQ
- Have an understanding of how a large dam works, including flood mitigation strategies.
- Be aware of other fresh water storage facilities in SEQ
- Be able to locate the major water resources on a map, using appropriate mapping conventions.

The Lesson:

INTRODUCTION:

Begin the unit with a class discussion about dams and water storage. Revisit the information covered in the Hinze Dam lesson. Use a large map to show where Brisbane is located and the location of Wivenhoe Dam in relation to the coast and the city.

Discussion Points

Why do we need such a large dam?

How many swimming pools do you think could fit in the Wivenhoe dam?

Who uses the water in Wivenhoe?

What uses other than holding water for use can a dam serve? (Getting at flood mitigation)

Floods of 1974 and 1893

Activity

On an outline map (supplied) label the following:

- Brisbane City
- Moreton Bay
- Wivenhoe Dam
- Hinze Dam
- Brisbane River
- Major islands of Moreton Bay/ SEQ
- Ensure the map has the appropriate mapping conventions (Frame, North-point, Key, Title, Scale, Source)
- Flood levels along the Brisbane River from the 1974 flood. (*Optional/extension*)

Optional Activity

Movie "The Deluge" (1999 – G rating)

Discussion Point

Is Wivenhoe our only dam in SEQ?

Ask students how many dams there are in SEQ that supply water to communities in SEQ.

Name the other major dams in SEQ.

Activity

Students to label on their SEQ maps the other significant dams that supply water to our communities.

- Somerset Dam
- Northpine Dam
- Borumba Dam
- Contributing rivers for each Dam

Conclusion

In a quick revision quiz, name three major dams in SE Qld.

Explain briefly why we need dams.

Resources

For the Teacher

SE Qld Map Master copy
 Movie "The Deluge" (G) (1999) starring Ray Barrett

For the Student

SEQ map blank copy

Lesson Four

Linking our Water Resources – The Water Grid

Student Objective

By the end of this lesson, students will:

- Have an understanding of why we need to link our water resources
- Be able to demonstrate by means of a mapping activity which water resources have been linked.
- Understand how linking our water resources ensures water supply for the future.

The Lesson

Introduction

Use an image of a large pipe with Premier Anna Bligh standing beside it (Image can be found at www.thepremier.qld.gov.au/library/images/newsroom/audio/watergrid.jpg) Ask students if they know what the pipe is for (and who the person on the right of the image is)

Discussion Points

Why do we need to pipe our water from one place to another?

How do we do this?

How is this pipeline going to help the people of SE Qld?

How is this pipeline crucial to the use of desalinated water and recycled water?

One of the aims of the Water Grid is to reduce the need for severe water restrictions.

Ask the students to explain some of the things we can't do when we have severe water restrictions. (They may like to do this in a group as a brain storm activity)

In Class Research Activity:

In groups of three and with access to the internet, students need to research one of the following questions:

1. How is the water moved from one place to another?
2. What volume of water is moved via the water grid and at what rate? (Relate this to swimming pool size volume)
3. Where is the majority of the water moved to and from?
4. How does this water grid enhance the desalination and recycled water programs?
5. How many people have been involved (or are currently involved) in the construction of the water grid. How much has it cost?

Once students have researched this information, they need to feed back to the class and share what they have learnt into a pool of common knowledge.

Activity:

On the map of SE Qld used in the previous lesson, students are to mark in where the water grid pipelines are going to link the different dams. They will need to mark in two colours –

- one to show current pipelines
- one to show proposed pipelines.

(A master copy of this can be found at www.dip.qld.gov.au/resources/map/south-east/seq-water-grid-map.pdf)

Extension Activity:

Design a board game that uses the concepts of the water grid moving water around. Fast flow, maintenance and high rainfall could all be factors that advance or slow down the movement on the board. Get creative and apply your knowledge!

Resources

For the Teacher

- Water Grid Map – Moving water to where it is needed
<http://www.seqwgm.qld.gov.au/Water-Grid-Operations/About-the-Water-Grid/Connected-Assets.aspx>
www.dip.qld.gov.au/resources/map/south-east/seq-water-grid-map.pdf

For the students

- Map of SE Qld (from Lesson three)

Lesson Five Healthy Catchments

Student Objective:

By the end of this lesson students will:

- Understand what a catchment
- Understand the need to look after our catchments and protect the species that live there
- Be able to demonstrate a way that they can look after catchments personally

The Lesson;

The host of this lesson is Craig the Cockatoo (one of the catchment creatures) who is the 'Guardian of the catchment'. In order for students to understand the need for healthy catchments, we need to ensure that they understand what a catchment is.

Introduction:

Ask the students if they have ever heard of a catchment and know what it is.

Get talking about the Cockatoo. Where does he live and why might he be the Guardian of the Catchment?

Discussion points

What is a catchment?

What is the difference between a first order stream and a river?

Activity:

Using the 'Catchment Illustration' (from the Healthy Waterways Resources), identify the following:

- Gullies
- First order streams
- Streams
- Rivers
- Dam
- Estuary
- Use arrows to show the direction of flow.

Discussion points

What is the name of the catchment the school is in (This might require a bit of research on your part or that of your students!)

Where does all the water ultimately end up?

It is important to get students thinking about storm water too, as this is not treated but flows directly into streams and waterways.

How does storm water from our towns and cities affect our catchments?

Who lives in our catchments?

Extension Activity

Which species are indigenous and which are introduced?

Why have the introduced species been released?

How have they impacted the ecosystem?

Look at the impacts of human activity in catchments.

Deforestation in the upper gullies of many catchments has negatively impacted our ecosystem, with erosion and transportation of alluvial material impacting stream habitats.

Farming and the application of artificial fertilizers, particularly nitrates and phosphates have altered the chemical balance of many waterways, often causing algal blooms.

Get students to identify the problem and look at solutions to minimise the impact of human activity in our catchments.

Activity

Using Craig the Cockatoo, get the student to design a cartoon sequence that shows an unhealthy catchment and what needs to be done to improve the health of our catchments. Students might also like to pick another 'Catchment Creature' to feature in their cartoon.

Get involved!

- Is there a section of creek in your local catchment nearby that you could adopt and clean up? Monitor the changes over the year and at the end of the year, pass it on to the next year level coming up. Join Water Watch and get involved!
- Participate in "Clean Up Australia Day (Held this year on March 7th)

Resources

For the Teacher

- "Catchment" Teacher Notes
www.cleanup.org.au/au/Campaigns/water-and-climate-change.html
- Blank cartoon Strip outline
- Catchment Illustration Master Copy and outline

For the Student

- Blank cartoon strip
- Catchment Illustration outline

Lesson Six

Environmental Sustainability and Wise Water Use

Student Objective

By the end of this lesson students will:

- Understand how humans impact our environment
- Understand the concept of Sustainability and how it relates to Qld.
- Understand the need to look after our catchments and protect the species that live there
- Be able to demonstrate ways they can personally use water wisely.

The Lesson;

Most students should be reasonably well versed in water wise activities, so some of this content may well be revision!

Introduction

Begin the discussion with talk about a dripping tap...

Get the students to guess how much water a dripping tap would waste in:

- One minute
- One hour (1 L)
- One day
- One month
- One year

Then give them the figure of one litre wasted per hour. Then get them to calculate the rest. Either way, dripping taps are a great big waste of water!

Discussion Points

Environmental sustainability is a key issue that must be addressed in our water management within Australia.

How does a growing population impact our water usage?

What does the government need to do to address these issues?

Activity: The Story of a River (adapted from DERM Activity - see website listing in resources for original)

To complete this activity you will need:

- One large bowl (approx 10 – 20 l capacity - A fish tank would work nicely) to represent the river
- A copy of "The Story of the River"
- Catchment story labels
- 13+ film canisters or something similar (available from most photo labs). Number needed depends on class sizes.

How it all comes together.

In this story there are 15 land uses, represented by different substances that are provided in canisters by you. As the story is read, the students will need to add their land use 'character' to the 'river', thus demonstrating how we can influence our waterways. Students are not to look in their containers until their 'character' emerges in the story.

In the canisters you will need:

Land use	Substance	Quantity
<i>Herd of Cattle</i>	<i>Thick muddy water</i>	<i>Canister</i>
<i>Farming country</i>	<i>Baking powder</i>	<i>Teaspoon</i>
<i>Piggery</i>	<i>Thick muddy water</i>	<i>Canister</i>
<i>Grazing land</i>	<i>Salty water</i>	<i>Canister of water with 1tsp salt</i>
<i>Hobby farm</i>	<i>Yellow water/toilet paper</i>	<i>Coloured water with paper fragments in a canister</i>
<i>Fishing</i>	<i>Tangle of line</i>	
<i>Water skiing</i>	<i>Vegetable oil</i>	<i>1 tsp</i>
<i>Park</i>	<i>Polystyrene/plastic</i>	<i>Small pieces broken up in canister</i>
<i>Tourism</i>	<i>Paper/plastics etc</i>	
<i>Subdivision</i>	<i>Soil</i>	<i>Canister</i>
<i>Gardens</i>	<i>Baking soda (Pesticides)</i>	<i>1 tsp in a canister</i>
<i>Roads</i>	<i>Vinegar (acid run-off)</i>	<i>Canister</i>
<i>Forest</i>	<i>Tea</i>	<i>Canister</i>
<i>National park</i>	<i>Mulch</i>	<i>1 tsp</i>
<i>Industry</i>	<i>Soapy water</i>	<i>Canister (1 drop in water)</i>

(Please see next page for the Story)

Discussion points

What do we do to our waterways?

How can we better manage our land use so that it minimises our impact on the environment?

How different would this story be if there were no people in it?

Conclusion

Get the students to write their own version of this story, before the river was influenced by humans and their use of the land (home work task).

Resources

For the Teacher

- Copy of the story
- Canisters (approx 20+, depending on class size)
- Canister Labels
- Ingredients, as specified above
- One Large Bowl or fish tank

Cross Curricular Opportunities

Mathematics – reading metres

Lesson Six - The Story:

- “This is the story of a river travelling through its catchment. It begins in the higher parts of the catchment where the rain runs off the slopes and begins its long journey to the sea. The river flows through a **national park** and then through a **forest**. The water gathers momentum as it descends the slopes.”
- The river continues its journey towards the sea through **farming country** where, recently, some crops were fertilised. Afterwards they were watered and the run-off into the river has brought with it some of the fertiliser.
- The neighbouring farm is a **piggery**. Some of the manure from the piggens washes into a drainage pipe, which then empties into the river. On the other side of the river are **grazing lands**. There are very few trees remaining and, in some of the lower parts of the pasture, the water brings salt in the soil up to the surface, making the land unusable. IT also means that run-off from the land is salty and this threatens the fresh water organisms and animals that live in the river. A **grazing herd of cattle** feed on the vegetation on the banks and drink from the river. When heavy rains arrive, the banks erode and collapse into the river.
- Slowly the river starts to wind its way through the outskirts of a major town. Here there are a number of **hobby farms**.
- The houses here are not connected to the sewerage system; they have their own septic tanks. Occasionally these tanks overflow and untreated sewerage seeps directly into the river.
- There are a number of people making use of the river around the bend. Someone is **fishing** on the banks. Unfortunately their fishing line gets caught on a rock and is left in the water. Other people are **water-skiing**. Their boat needs a service and its engine is leaking oil directly into the water. Another group of people are enjoying a picnic at a **park** overlooking the river. A gust of wind blows some of their rubbish off the table and into the water.
- Further downstream the river is being utilised for **tourism**. A charter boat is giving some people a scenic tour of the river. Drinks are for sale, but not everyone uses the bins that are provided.
- The river now starts to meander through the suburban part of town. A new **subdivision** is being developed. Many of the trees have been removed and when it rains the top layer of soil is eroded and contributes to the silting up of the river. Most houses in the developed parts of town have a garden. To keep pests and nasty bugs away, the gardeners use a range of pesticides. When it rains, the pesticides wash off the **gardens**, into the storm water drains and then into the river.
- People who have spent the day at work are now starting to drive home. The **roads** are choked with traffic. Oil drips out of these cars and sometimes they brake in a hurry, leaving traces of rubber on the roads. Every time it rains, these pollutants are washed into the storm-water drains and straight into the river
- There is still some **industry** along the river here. Detergents are used to keep the production equipment clean. Sometimes the dirty water is washed out of the factory and into the gutter where it disappears into the storm water drains. Once again, this water flows straight into the river. If there are phosphates in the detergent, they cause increased algal growth in the river. When this algae dies, it rots, using up valuable oxygen in the water. Many animals may suffocate as a result.
- With one final bend, the river finally arrives at its mouth and spills out into the sea. But just look at what flows out with it...!

Other local river uses can also be added to this activity to give the students ‘ownership’ of the task.

Lesson Seven

Our Climate Water Supplies – Brisbane

Student Objectives

By the end of this lesson students will:

- Be able to construct a simple climograph
- Interpret basic data from the climograph
- Have an understanding of when our peak rainfall and warmest average temperatures occur (Brisbane)
- Understand on a basic level the challenges of water supply when the climate does not deliver regular water.

The Lesson:

Introduction:

Begin by getting the students attention with a couple of questions.

Who in the class has lived in Brisbane the longest? (There are bound to be some that were born here and have never lived anywhere else). Ask them to tell you when the wettest month of the year is, in their experience (this way, going by their experience it is opinion and not fact, so they can not be wrong).

Also ask for the:

- Hottest month
- Driest month
- Coolest month
- Favourite month

Ask along the way if there are opinions that vary from those given. (Should you get multiple students that have never lived anywhere else, get them to answer one question each). Record their responses on the board.

Ask the students if they know of any way of finding out this data accurately (leading to the climograph)

Learning – Constructing a Climograph.

You will need to display the following data somewhere for the students. (OHT, on the board or read it out as you go).

Use the follow data (1949 – 2000) to construct a climograph of Brisbane.

Month	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Av Temp (3pm) °C	27.6	27.4	26.7	25.0	22.4	20.3	19.6	20.6	22.4	23.9	25.6	26.9
Mean Rainfall (mm)	157.7	174.6	138.5	90.4	98.8	71.2	62.6	42.7	34.9	94.4	96.5	126.2

Statistics provided by www.bom.gov.au/climate/averages/tables/cw_040223.shtml

Step the students through the construction of the graph. (Instructions should be found in most Jacaranda Atlases or Geography textbooks.

Students can then read their graphs and compare the data from the 'opinions' shared earlier in the lesson.

Alternative Worksheet

Alternatively, students can complete the Jacaranda Atlas worksheet which can be downloaded from: <http://www.jaconline.com.au/jacarandaatlas/html/planner.jsp?searchBy=browseAll&curSubmit=Go> (select climographs)

Conclusion

How does the climate change that seems to be happening provide challenges for us in ensuring a consistent water supply for the future?

Lesson Eight

Water Sources – Climate vs. Non-Climate Water

Student Objective

By the end of this lesson students will:

- Have a basic understanding of sources of non-climate water
- Be able to differentiate between climate and non-climate sources of water
- Understand how we can supplement our water needs with non-climate water resources, particularly desalinated water.

The Lesson

Introduction

Begin a revision activity on the board of the water cycle. Get the students to name the different parts of the cycle and give a basic explanation of how that part of the cycle works

Discussion points

Where is the water stored on our planet?

Can we use it all?

How can we alter the water around us so that it is fit for human use (i.e. drinking)?

What do we know about desalinated water?

Activity

IN groups of 3 – 5, have a brainstorm about desalination. Give the students 4 minutes to write down everything they know about recycled and desalinated water. Then get them to come back to the class and share what they know.

(Use this activity to ascertain prior knowledge about desalinated water and recycled water)

Give a brief summary of how desalination works (i.e. removing the salt and other minerals from the water) For more information, check out www.watersecure.com.au/dev/what-we-do/desalination

Extension Activity

For the scientifically minded, draw a flow diagram that shows how the water is treated within a desalination facility. At each stage, show what is removed and what happens next. (The Osmosis part might take a bit of explaining)

Discussion Points

Not everyone is keen on the idea of taking our drinking water from the sea.

Why might this be?

In columns, come up with ideas why people might be for or against the idea of desalinated water. Here are a few to get you going...

Reasons for Desalinated Water	Reasons Against Desalinated Water
<ul style="list-style-type: none"> • Provides a guaranteed water source • We need the water for our growing population in SE Qld • Our climate is very variable and we can not always count on the water from our climate 	<ul style="list-style-type: none"> • It might taste salty! (Some people actually think this!) • The excess salt taken from the water creates a waste problem • It might make the sea saltier when the salt taken out is put back into the environment

Public discussion is one of the key ways of people expressing their concerns and they all need to be taken into consideration when decisions are made that impact our communities.

Once students have formulated some ideas for and against the concept of desalinated water, get the to form teams and have a debate/discussion about the topic. They could represent different groups in society (i.e. environmentalists, local boat users/fishermen, indigenous Australian's, Members of the

Council or Government, builders & engineers etc) Encourage students to use persuasive language to get the others to see their point of view.

Alternatively, openly form two teams (for and against) come up with a moot and debate away!
Another slant on this issue can be found using the catchment creatures – which of them would be impacted by a desalination facility?

Optional activities

Mapping task

On a map, locate and mark the Gold Coast Desalination facility.

Locate and label the other potential sites that have been identified for future desalination facilities should they be needed.

Conclusion

Give the students a quick quiz about water sources and ask them to identify whether it is a climate or non-climate water source.

Ground water	Desalinated water	Bore water
Dam water	Dew	Rain water
Tank water	Recycled water	Tap water
Lake water	Grey water	River water

Resources

For the Teacher

- www.qwc.qld.gov.au/SEQWS (Desal PDF)
- www.watersecure.com.au/dev/what-we-do/desalination
- Master map of SEQ

For the Student

- Blank map of SE Qld

Cross Curricular Opportunities

Science – The scientific process of Osmosis

English – the finer skills of debating

Mathematics – calculations and percentages pertaining to the water treatment process (Percentage, Ratio, Fraction)

Lesson Nine

Treating Our Water

Student Objective

By the end of this lesson, students will:

- Understand the need to recycle our water
- Have a basic understanding of how water is recycled
- Understand how water can be used at different levels of filtration

The Lesson

Introduction

Start the lesson with three beakers of water – one clean, one slightly cloudy and one obviously dirty. Use this as the focus point for you discussions about recycled water.

Discussion Points

What is recycled water?

Why do we need it?

What is it used for?

How is it treated (to gauge prior knowledge)

Learning - Recycling Our Water

When most people think about recycled water, they imagine drinking it. However, there are a multitude of water uses that don't actually involve us consuming the water. Industry has high demands on our water resources and recycled water is a great way to meet these demands. But what does 'Recycled Water' actually mean and what does it involve? And is the 'recycled water' actually clean enough for us to drink?

Using access to computers and the internet, have students take a look at what is involved in the 7 Barrier filtration method used in Queensland. Research in pairs may speed up the process.

Focus questions

What is removed at each stage?

What can the water be used for at each stage?

What are the advantages of recycling our water?

How will this help us meet future water needs?

There are some excellent resources available at

http://www.derm.qld.gov.au/waterwise/education/units/year6_7_unit2.html

Activity – Experiment – making your own filter

You will need:

- 2-litre soda bottle cut in half (by an adult)
- napkins or paper towels
- gravel, sand and cotton balls for your filter
- dirty water, you can make it by adding cooking oil, food coloring, pieces of paper, and tiny pieces of Styrofoam to water

Making it Happen

1. Put the top half of the soda bottle upside-down (like a funnel) inside the bottom half. The top half will be where you build your filter; the bottom half will hold the filtered water.
2. Layer the filter materials inside the top half of the bottle. Think about what each material might remove from the dirty water and in what order you should layer the materials. For an added challenge, use only two of materials to build your filter.
3. Pour the dirty water through the filter. What does the filtered water look like? Provide a description both before and after filtration.
4. Take the filter apart and look at the different layers. Can you tell what each material removed from the water?
5. Wipe the bottle clean and try again. Try putting materials in different layers or using different amounts of materials.

Extension Activity

Try using different materials to filter the waste from the water. Which of the materials used best filtered the water?

Activity - How clean are you at home?

Complete the 'Pollution – how does your household rate?' survey, which can be found at www.cleanup.org.au/au/Campaigns/water-and-climate-change.html (in the 'down the drain' pdf) This is an excellent survey for students to relate clean waterways and sewage to their own homes.

For the Teacher

- www.cleanup.org.au/au/Campaigns/water-and-climate-change.html
- 2-litre soda bottle cut in half (by an adult)
- napkins or paper towels
- gravel, sand and cotton balls for your filter
- dirty water, you can make it by adding cooking oil, food coloring, pieces of paper, and tiny pieces of Styrofoam to water
- Resource Sheets 7 & 9 (which can be found at http://www.derm.qld.gov.au/waterwise/education/units/year6_7_unit2.html are well worth a look.

For the Student

- A copy of the Pollution survey
- Materials for experiment (as supplied by teacher)
- Resource sheets 7 & 9

Lesson Ten Introducing the Scenario

Student Objective

By the end of this lesson students will:

- Understand the task ahead of them
- Have formulated working groups
- Started brain storming ideas to meet the scenario objectives

The Lesson:

The direction this lesson takes is entirely dependent on the selection of scenario and whether the class will all attempt the same scenario.

However, irrespective of that the following will apply.

Factors to consider/things to think about include:

- The selected scenario – which one will you do or has this been set for you?
- Strengths and weaknesses of the group members (i.e. do you have a technical genius? Is one member of the group good at writing/art/super creative?)
- Brainstorming – come up with lots of ideas and narrow it down. Remember to keep it practical and realistic. You will have a deadline to meet!
- Agree on an idea as a group
- Grow the idea – Break the task down and decide who is going to do what?
- Work out resources you will need to make your idea a reality. Who is going to provide the materials you will need. Do you need your teacher to supply anything? Are you going to need computer/internet access during class time for research?
- Plan and set goals to make your idea come to life. This is particularly important if you are making a model as it takes a lot of time and can't be made the day before!
- Keep in touch with your teacher. Let them know if you encounter a problem
- Have fun!

Resources

For the Teacher

- Scenario/s
- Competition guidelines
- Up a Dry Gully Fact sheet

For the Student

- Scenario/s
- Up a Dry Gully Fact sheet

Lessons Eleven + Building Your Ideas and Making Them a Reality

From here on, the students will need to formulate their ideas and make them come to life. Under supervision of the teacher, students will need to look at their selected scenario, work together as a group and keep the communication channels open with the teacher.

Remember this is not about the biggest, flashiest idea, but the team that best demonstrates their understanding of the scenario and helps come up with solutions to the water challenges of the future.

Should you require any additional help, please do not hesitate to contact us.