A Simple Guide to Developing a

SCHOOL WATER USE Plan

This unit is designed for use by students in stages 2 to 6.

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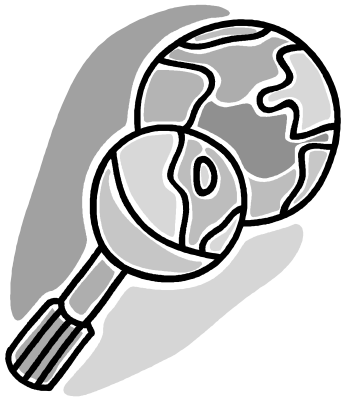
Why have a Water Use Plan?

Water is precious.



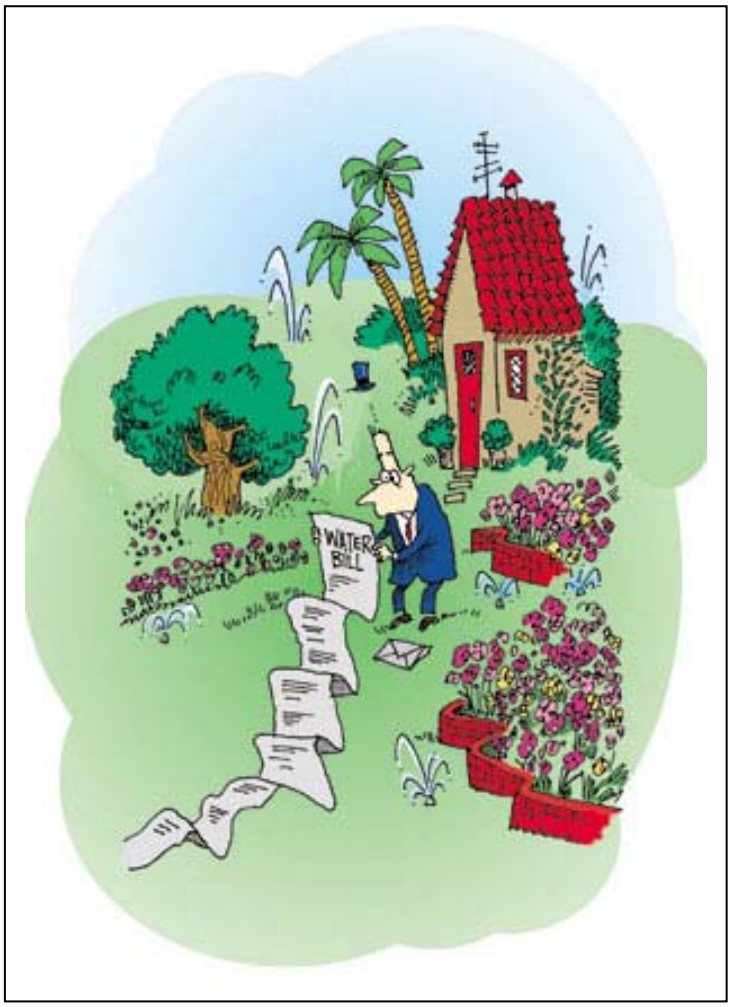
Australia is the driest inhabited continent in the world.
Water restrictions now apply in most major cities in Australia.
In the south-east of Australia (the most heavily populated region) the climate is becoming warmer and drier. Go to www.bom.gov.au/climate/change/
Population growth and more water hungry lifestyles (spas, swimming pools, dishwashers etc) are pushing up the demand for water.
Although 75% of the earth's surface is covered with water:

- 97% is **salt water** in our oceans.
- 3% is fresh water and of this, 2% is frozen in ice caps, snow and glaciers.
- 0.5% is underground and so only 0.5% is useable fresh water.

Do we really need to use purified drinking water to flush toilets and water lawns? What are the options…..recycling grey water? Harvesting storm water? Desalination? (see *Appendix 9* for further information).

The Central Coast Water Supply

Our town water comes from local rivers and creeks. *see diagram Appendix 5*



We are currently using more water than is being received and our dams are at an extremely low level. Consequently we have restrictions on our water use and increased community interest in planning to meet the future water demands of a growing population at a time of global climate change. For more information on the local water supply and current dam capacities go to the 'Facts and Figures' section of 'Gosford-Wyong Councils Water Authority' website at www.gwcwater.nsw.gov.au

Long term rainfall patterns for the Central Coast are contained in *Appendix 7.* For more information go to the Bureau of Meteorology website at www.bom.gov.au

How to do a Water Audit at your school

The water audit is the first step in planning. It attempts to identify where water is being used, by whom, when and how much. It also describes the current water saving devices such as dual flush toilets, water tanks, spring loaded taps etc

An alternative to the manual recording and calculating method provided on the following pages is the automatic water audit calculator available at https://detwww.det.nsw.edu.au/assetmanagement/envisust/solar2.htm

School Water Usage Calculator

School Name:
School Enrolment:

Billing Period	Number of Days e.g. 60 days	Charge type	Volume of water used (Kilolitres)	Usage Charges ($)
1st Period		Water		
		Sewer		
2nd Period		Water		
		Sewer		
3rd Period		Water		
		Sewer		
4th Period		Water		
		Sewer		
Total	0		0	0

Water Use Overview

Total Billing Days		0	Days
Water Usage			
Total Volume of water used		0	Kilolitres
		0	Litres
Litres per Student per Day			L/Student/Day
Primary School Target	6 L/Student		
Secondary School Target	9 L/Student		
Costs			

Preparation

You will need to organise groups of students for each of the following tasks:

1. **Analysing** the water bills. (3 students)
2. **Reading** the water meter to analyse water use. (3 students)
3. **Counting** all the schools water outlets and checking for drips. (5 x 3 students)
4. **Interviewing** the school community about water use (3 students)
5. **Reporting** on the audit process and taking photographs. (3 students)

Remember to:

- Inform other staff that you will be conducting the audit. Request that students be allowed to enter classrooms to do the audit.
- Arrange for the general assistant, cleaner, principal, parents and teachers to be interviewed by students.
- Ensure that permission notes to allow photos are returned by students.
- Issue a media release to promote your school's activity.

Group Activities

GROUP 1: Analysing the Water Bills

This group will need the water bills for the previous 12 months and a calculator. Their task is to calculate and report on:

- The Cost of water (cents/kL);
- The Amount of water used in the previous year (kL);
- The Average water use per person per day (L/person/day). (*divide the annual consumption by the number of people in the school and then divide this by the number of days. Multiply by 1000 to convert from kL to litres)*
- Any significant difference in water consumption for different billing periods.

Summary of the school's water bills:

Time Period of Bill & Number of Days (a)	**Cost / kL**	**Water Use (kL)** 1 KL = 1000 litres (b)	**School Population (c)**	**Average L /person/ School Day** (b/c/a*1000)
eg 25/11/03 to 27/4/04 100 school days	92.5c/kL	*1400kL*	*350*	*40L/person/day (1400KL/350/100* 1000)*

Discuss any significant differences in water consumption for different billing periods.

Find out if water restrictions applied during the billing period. If so then report on how they impact on water use at the school. Go to www.gwcwater.nsw.gov.au

GROUP 2: Reading the School Water Meter

Black numbers measure kilolitres (thousands of litres). Red numbers measure fractions of kilolitres. The example above totals 7,902 kilolitres + 319.4 litres or 7902.3194KL.

This group will need to know where the water meter is and how to read it.

They will also have to plan when to read the meter in order to answer questions such as:

- Is more water used at recess than at lunch?
- Is more water used on some days than others?
- Are there any leaks in the school?
- How much water is used by the cleaners?
- What is the pattern of water use in a typical school day?
- How much water is used on the school grounds?

Not all of these activities can be done in one day.
Try to **predict** the answers to questions before you take the measurements.

Water consumption in litres.

The meter generally reads from left to right - black digits show the kilolitres (1,000 litres) and red digits measures fraction of kilolitres. Your meter may have two, three or four red numbers.

If the meter has:

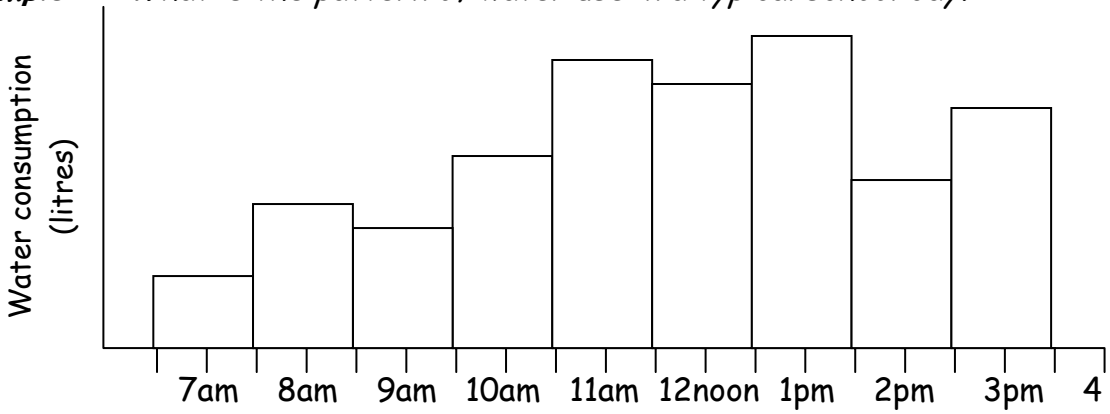
2 red numbers – record the 2 red numbers and add a zero to the end.
3 red numbers - record all red numbers.
4 red numbers – record the first 3 numbers only.

Record these numbers in a table similar to that in example 1 below.

Example 1: *Is more water used at recess than at lunch?*

Date	Time		Meter Reading	Water Consumed
5 Aug 06	*Recess*	*11.00 am*	*319*	*20 litres*
		11.20 am	*339*	
	Lunch	*1.00 pm*	*349*	*30 litres*
		1.40 pm	*379*	

Example 2: *What is the pattern of water use in a typical school day?*

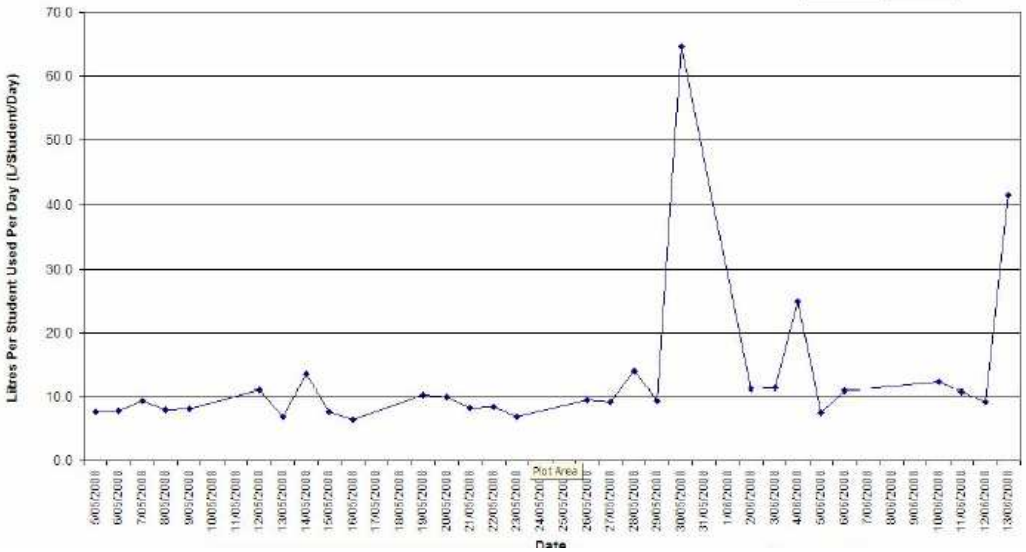


What does it mean? Analyse your results and put a brief summary of your findings into the Water Use Plan. See *Appendix 1*.

An alternative to the manual graphing of records is 'the Brainmeter' which is available on the DET Website at
https://detwww.det.nsw.edu.au/assetmanagement/envisust/solar2.htm

Meter location:	Week	Date	Day of Week	Water Meter Readings: Before School Reading	Before Recess Reading	After Recess Reading	Before Lunch Reading	After Lunch Reading	End of school day (10 minutes before school bell) Reading	Results: Litres used per day (litres/day)	Litres used Student p (L/Studen
1											
Student Enrolments:	Week 1	20/10/08	Monday							0	0.0
1		21/10/08	Tuesday							0	0.0
School Name:		22/10/08	Wednesday							0	0.0
1		23/10/08	Thursday							0	0.0
		24/10/08	Friday							0	0.0
Weekend Usage (l)	Week 2	27/10/08	Monday							0	0.0
Weekend 1		28/10/08	Tuesday							0	0.0
Weekend 2		29/10/08	Wednesday							0	0.0
Weekend 3		30/10/08	Thursday							0	0.0
Weekend 4		31/10/08	Friday							0	0.0
Weekend 5	Week 3	3/11/08	Monday							0	0.0
		4/11/08	Tuesday							0	0.0
		5/11/08	Wednesday							0	0.0
		6/11/08	Thursday							0	0.0
Meter 1		7/11/08	Friday							0	0.0
	Week 4	10/11/08	Monday							0	0.0
		11/11/08	Tuesday							0	0.0
		12/11/08	Wednesday							0	0.0
		13/11/08	Thursday							0	0.0
		14/11/08	Friday							0	0.0
	Week 5	17/11/08	Monday							0	0.0
		18/11/08	Tuesday							0	0.0
		19/11/08	Wednesday							0	0.0
		20/11/08	Thursday							0	0.0
		21/11/08	Friday							0	0.0
	6	24/11/08	Monday							0	0.0
		25/11/08	Tuesday							0	0.0

Figure 1- Litres per Student used per Day- Meter 1



GROUP 3: Counting the Water Outlets and Checking for Drips

This group will count all the water outlets in the school, describe features such as tanks, dual flush toilets, spring loaded taps etc and note any leaks or drips. A plan map of the school will help in dividing the group to cover different areas of the school. Each group will need a tally sheet (*Appendix 2*) and instruction on how to fill it out. Data from all areas of the school will then be combined in the table below.

Water Outlets in our school

Water Outlets	Total Number	Total Number Dripping		Comments eg broken taps, dual flush toilets, spring loaded taps, tanks.
		Slow	Fast	
Taps				
Bubblers				
Toilets / Urinals				
Other				

Water Loss from Dripping Taps

Measure the amount of water lost from slow and fast dripping taps in two minutes. Record this in the table below and then complete the calculations to find the amount of water that would be lost by all dripping taps in the school in one year.

Drip Rate	**A** mls in 2 minutes	**B** mls in 1 hr (**A** x 30)	**C** mls in 1 day (**B** x 24)	**D** litres in 1 day (**C** ÷ 1000)	**E** litres in 1 yr (D x 365)	**F** **number of dripping taps**	**Litres lost in 1 year** (**E x F**)
Slow							
Fast							

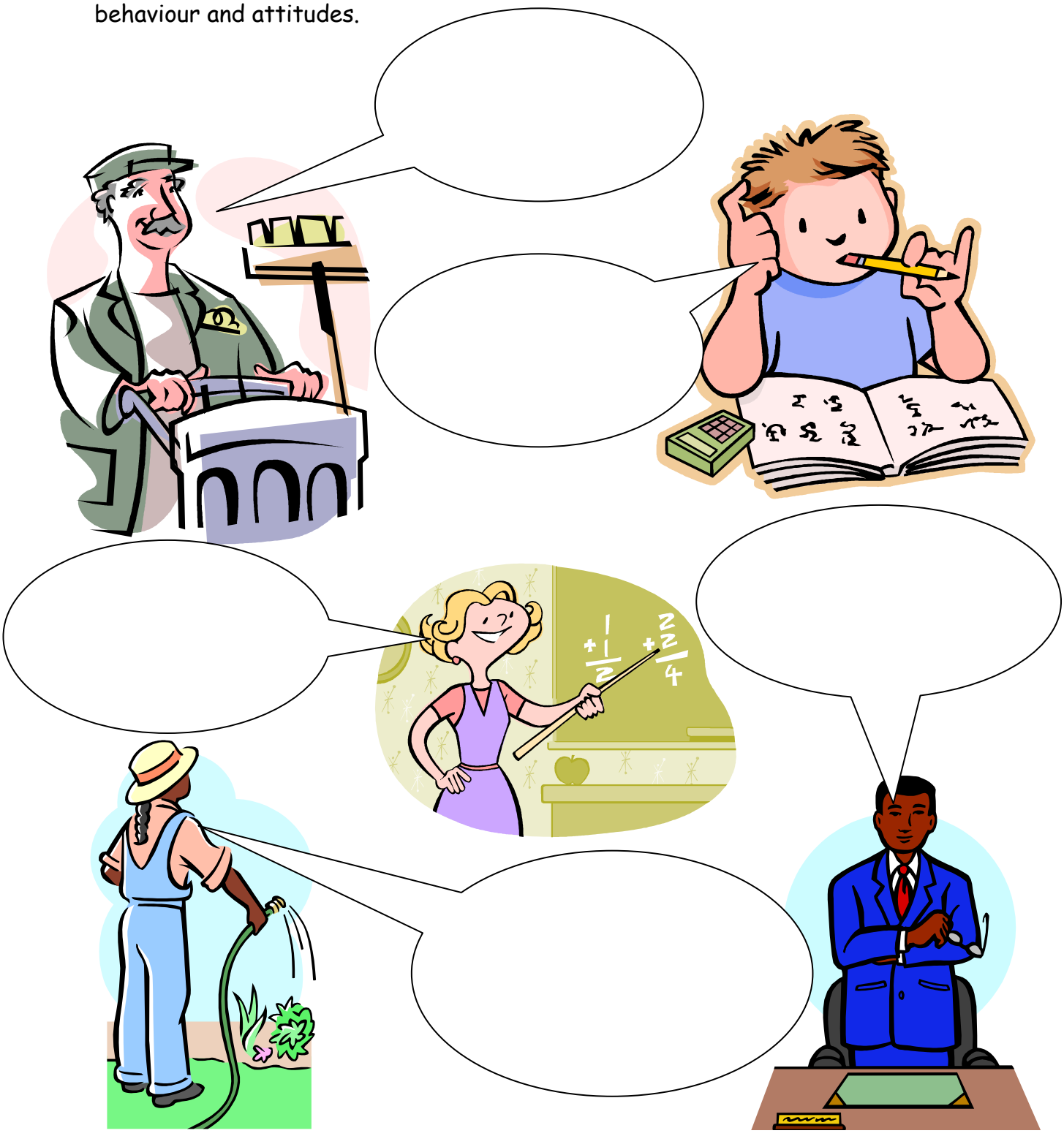
Put a brief summary of your findings into the Water Use Plan. See *Appendix 1*

GROUP 4: Interviewers

This group will survey some of the people in the school to find out about their attitudes, knowledge and ideas on water use.

Appendix 3 contains prepared interview questions for the cleaner, general assistant, the principal, teachers and students. You may ask other questions as well.

Write down their answers and then try to put together a report on water use behaviour and attitudes.



Put a brief summary of your findings into the Water Use Plan. See *Appendix 1*

GROUP 5: Reporters

This group will:

1. get photos, candid quotes and comments from students as they carry out the different water audit activities (these can be used in the report);
2. chair a meeting at which the other groups present their findings; and
3. manage a class discussion to get ideas for a school water saving plan.

1. Interviews:

examples of questions you might ask the different audit teams on the day:

- *What are you doing as part of our school water audit?*
- *What is the purpose of this activity?*
- *What have you found so far?*
- *Are you enjoying yourselves?*

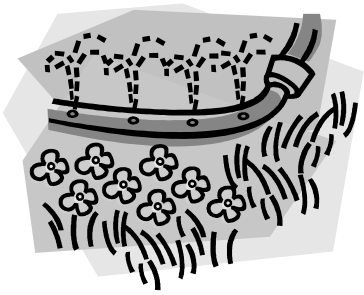
2. Chairing a Whole Class Meeting:

- Ask each of the audit teams to present a short report to the class on their activity and what they found out about water use.
- Ask the class to suggest ways in which the school could save water. Use a table like the one below to record suggestions. (*see Appendix 4)* A list of ways to save water is included in *Appendix 10*

Problems	Solutions	Date to be implemented	Who is responsible
(An example) Bubblers left running	*Water monitors check bubblers after recess and lunch*	*End of term 2*	*Year 5*

Some ideas for Using LESS Water at School

- Replace single flush toilets with dual flush toilets
- Replace continuous flush urinals with waterless urinals
- Install aerators on taps to reduce flow
- Install Low flow taps (6L/min is low flow)
- Install spring loaded taps that turn themselves off



- Remove the handles from outside taps
- Don't turn taps on too hard or leave them running too long
- Use a bucket when washing paint brushes
- Turn off taps properly. 1 drop / sec = 7000L of wasted water / year
- Volunteer to be a water monitor and check for leaks, running taps etc
- Use a mop or broom instead of a hose to clean toilets and paved areas
- Water gardens only in early morning or late afternoon to reduce evaporation
- Use drip irrigation and a timer so you don't forget to turn off the watering system
- Plant natives that survive without watering
- Install smart water meters that can be read from the computer
- Mulch the gardens

Produce a Water Use Plan.

A Water Use Plan only needs to be brief but should contain:

1. **Background**	Include information such as: - name and location of school, number of students and teachers at the school, date the audit was done and who participated in the water audit etc.
2. **Our School in Action**	Some photos and quotes from the day.
3. **Results**	Each of the audit groups can contribute their findings
4. **Problems and Solutions**	List your suggestions

The following frames are from Rumbalara's ready made Powerpoint presentation. All you need do is enter your school data to make it your own.

Then:

- Add it to the School's Environment Management Plan (SEMP)
- Show it to the school community to get support for its implementation

Appendix 1: Water Use Management Plan - Powerpoint Template

The School Water Bills show that:

- Water is cheap - just 92.5c for one thousand litres (1 kilolitre)
- We used 468 kilolitres in the last 12 months
  (31 May 05 to 1 June 06)
- *On average each person at the school uses about 13 litres of water a day* *(185 people for 200 school days)*

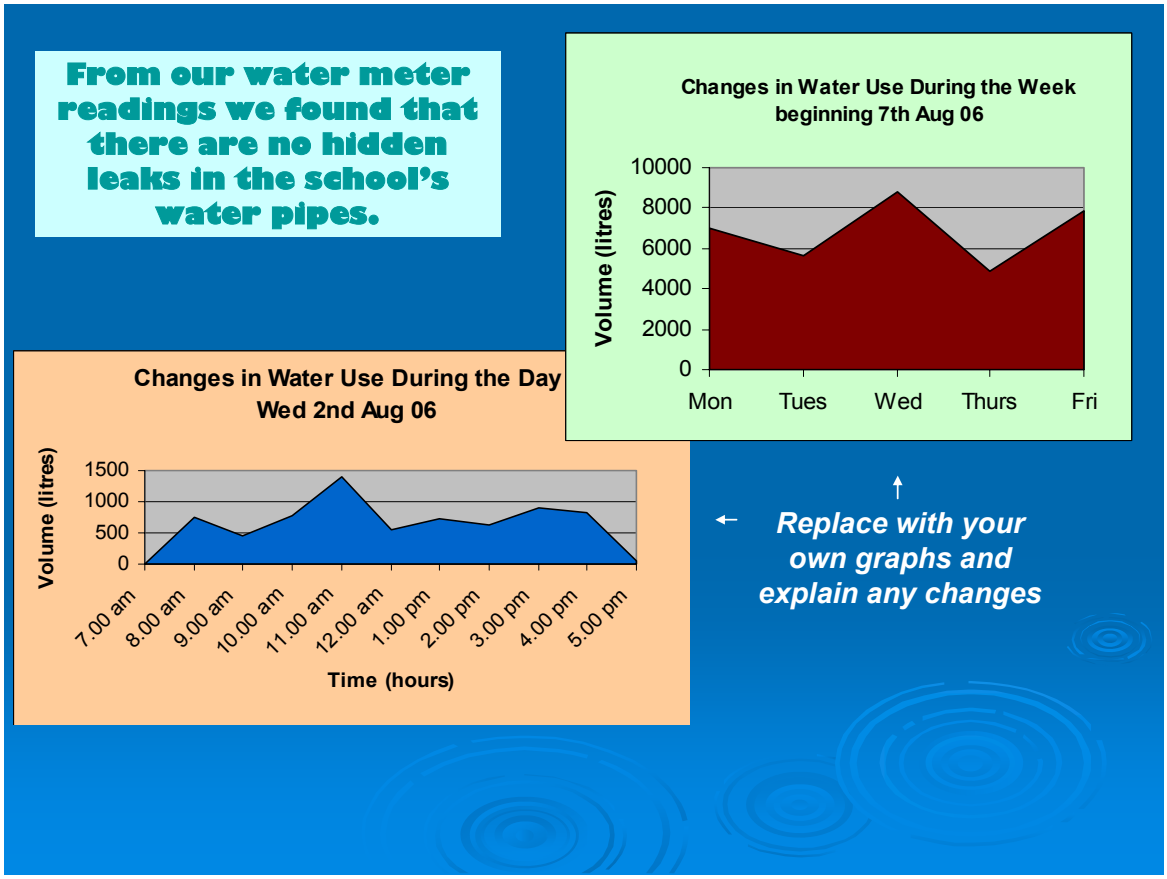
Drips & Leaks

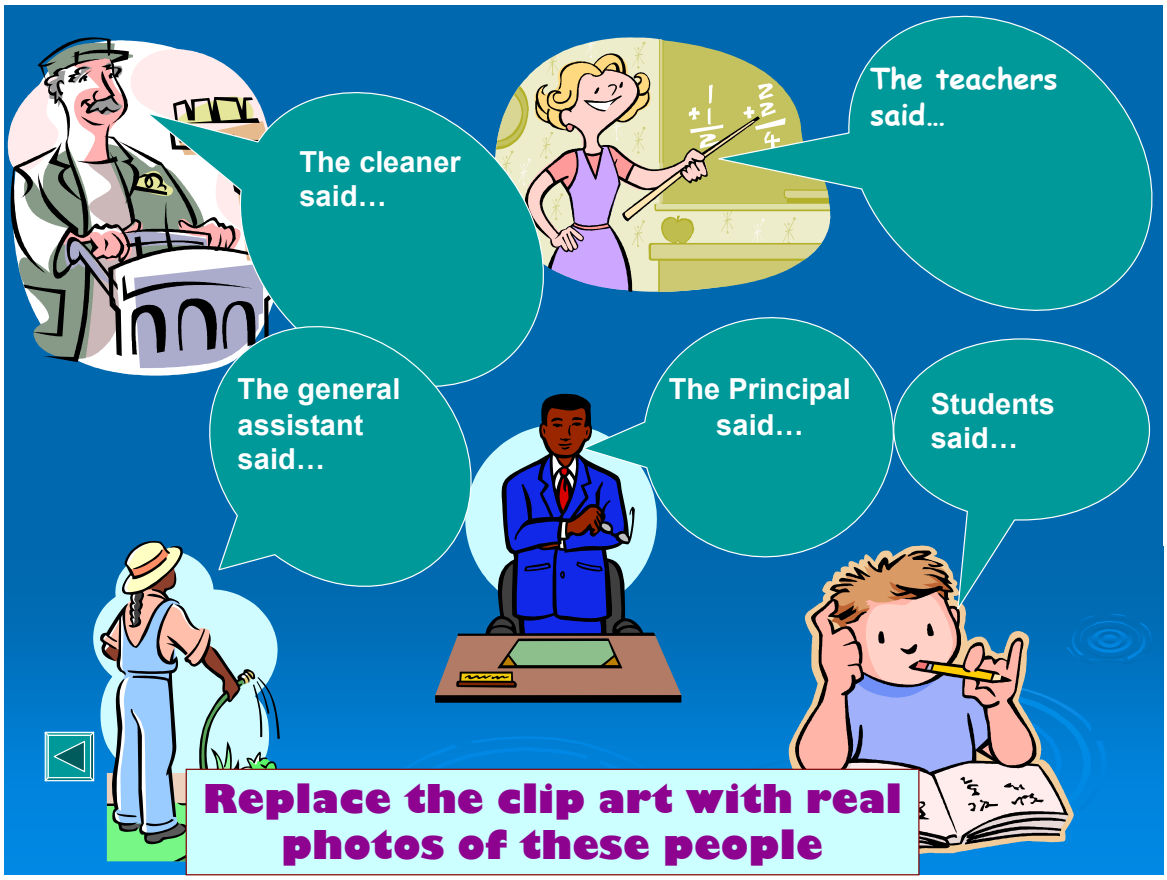
Water Outlets				
Total Number				
Number Dripping				

We found that a slow dripping tap would lose _____ litres in one day and that a fast dripping tap would lose _____ litres/day

If all the taps we found dripping in the school kept dripping for one year then we would waste _____ litres

Appendix 1:Water Use Management Plan Powerpoint Template





Our Water Action Plan

Problems

- Not all gardens in the school are mulched
- Some of the dripping taps were due to students not turning the taps off properly.
- Toilets use 12 litres per flush.

Solutions

- Mulch all the gardens
- Use school assemblies and signs posted near taps to remind students to turn taps off properly and not to waste water. Have students rostered to check all bubblers at the end of recess and lunch
- Reduce the flush volume by placing plastic water filled bottles in the toilet cisterns.
- Install water tanks and connect them to the toilets.

OUR TARGET: AVERAGE 12 LITRES PER PERSON PER DAY

THAT'S 700 KL IN THE NEXT 12 MONTHS

Appendix 2: Water Outlet Tally Sheet

Team _____ Area Surveyed _____

Water Outlets	**Number** (tally)	**Dripping** (tally)		**Comments** eg broken taps, dual flush toilets, spring loaded taps.
		Slow	Fast	
Taps				
Bubblers				
Toilets / Urinals				
Other				
TOTAL NUMBER				

Suggest ways in which water can be saved.

Appendix 3: Interview Recording Sheet: General Assistant

1.	What parts of the school grounds are watered regularly?	
2.	How are the gardens and grounds watered? (Hose / portable sprinkler / automatic sprinkler/other)	
3.	What time of the day are they watered?	
4.	Are the gardens mulched?	
5.	Do the garden plants need much watering?	
6.	Has the school installed any water saving devices? eg water tanks, bore water, spring loaded taps etc	
7.	Can you suggest ways in which water could be saved at this school?	
8.	Do water restrictions have any effect on your work or lifestyle?	

Appendix 3: Interview Recording Sheet: Cleaners

1.	In which areas of the school is a lot of water used for cleaning?	
2.	Where is the hose used in cleaning?	
3.	Can you suggest any ways in which the cleaning of the school could be changed in order to save water?	
4.	How much water do you think is used each day in cleaning the school?	
5.	Do water restrictions have any effect on your work or lifestyle?	
6.		

Appendix 3: Interview Recording Sheet: Farm Assistant

1.	Which farm activities use the most water?	
2.	Is the farm reliant on town water? If not what are the other water sources?	
3.	How are crops irrigated? *Hose / portable sprinkler / automatic sprinkler*	
4.	At what time of the day does the watering take place?	
5.	What are some of the practices that help to save water on this farm?	
6.	What are some ways that the farm could further reduce its water use?	
7.	Do agriculture students learn about water conservation from practices implemented here?	
8.		

Appendix 3: Interview Recording Sheet: Principal

1.	What should students do if they see water being wasted? (eg. leaking tap/toilet, hose left on) .	
2.	Do students learn about water conservation from what happens at school?	
3.	What methods does the school use to conserve water?	
4.	Can you suggest ways of further reducing water use at the school?	
5.	What do you think is the best solution to the Central Coast water supply problem?	
6.		

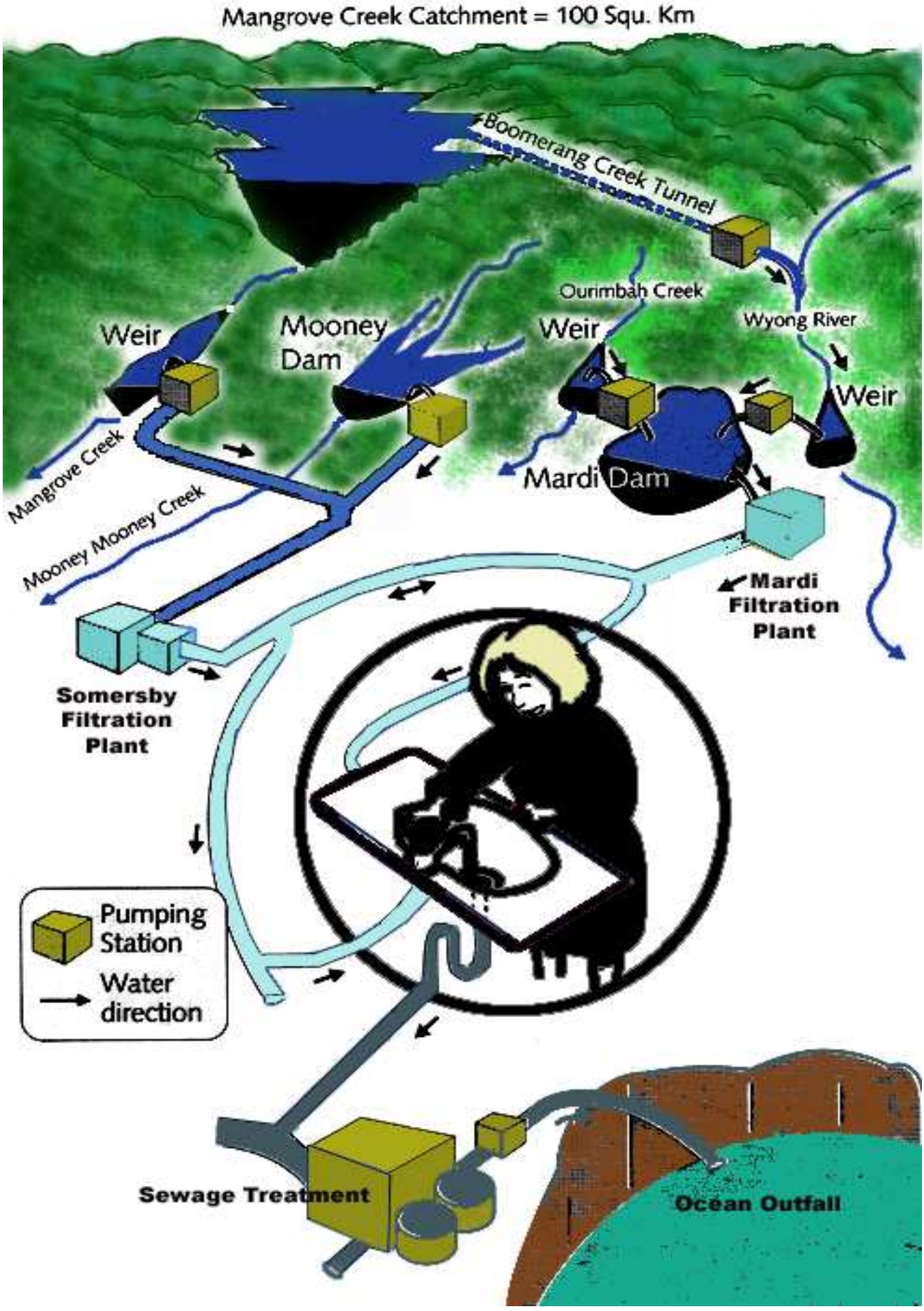
Appendix 3: Interview Recording Sheet: Teachers

Name:		
1.	Are students taught to conserve water? If so how?	
2.	Why do you think we have a water problem on the Central Coast?	
3.	What do you think is the best solution to the Central Coast water supply problem?	
4.	Do students learn about water conservation from what happens at school?	
5.	Can you suggest ways of further reducing water use at the school?	
6.	How do the current water restrictions effect your lifestyle?	
7.		

Appendix 4: Developing an Action Plan

Problems	Solutions	Date to be implemented	Who is responsible
(An example) Bubblers left running	*Water monitors check bubblers after recess & lunch*	*term 2*	*Year 5*

Appendix 5: The Central Coast Water Supply System



Appendix 6: Estimating Volumes

Did you know ?

Bucket	8 Litres
Toilet Flush	6-13 Litres
Bath	110 Litres (Half Full)
Washing Machine	169 Litres
Swimming Pool	50,000 Litres
Shower/minute	20 litres

How much water do you use when showering?

20 x …… (minutes in the shower) = _____ litres

If you installed a AAA rated shower head you would save 11 litres/minute.
If you installed a timer in the shower you might encourage shorter showers?

How much water would you save if you installed a water saving shower head **and** reduced your shower time by 5 minutes?

Appendix 7: Rainfall and Temperature Averages from the Narara Agricultural Research Station

(based on 110 years of records)

Month	Mean rainfall (mm)	Mean No. of Rain days	Highest monthly rainfall (mm)	Lowest monthly rainfall (mm)	Highest daily rainfall (mm)	MeanMax. Temp. (C)	Mean Min Temp. (C)	Mean 3pm Humidity (%)
Jan	139.3	11.0	517.5	4.3	210.8	27.1	16.5	62
Feb	148.2	10.8	597.7	0.0	191.8	26.9	17.1	61
Mar	153.0	11.2	500.3	6.0	205.5	26.0	15.3	63
Apr	137.4	10.6	661.9	4.6	218.4	23.8	11.7	60
May	115.1	9.1	634.0	6.1	177.3	20.2	8.0	66
Jun	128.7	9.6	664.0	1.9	170.7	17.5	6.3	71
Jul	78.5	7.8	455.6	0.0	194.8	17.3	4.0	60
Aug	73.0	8.0	426.2	0.0	119.2	18.7	5.1	55
Sep	68.5	8.2	232.1	2.0	106.9	20.6	7.2	61
Oct	84.0	8.9	344.1	1.0	129.3	23.4	10.6	59
Nov	93.0	9.5	361.5	4.1	155.2	25.1	12.6	58
Dec	103.0	10.0	417.0	6.0	155.0	26.9	15.0	61

- **Monitoring your local weather.**

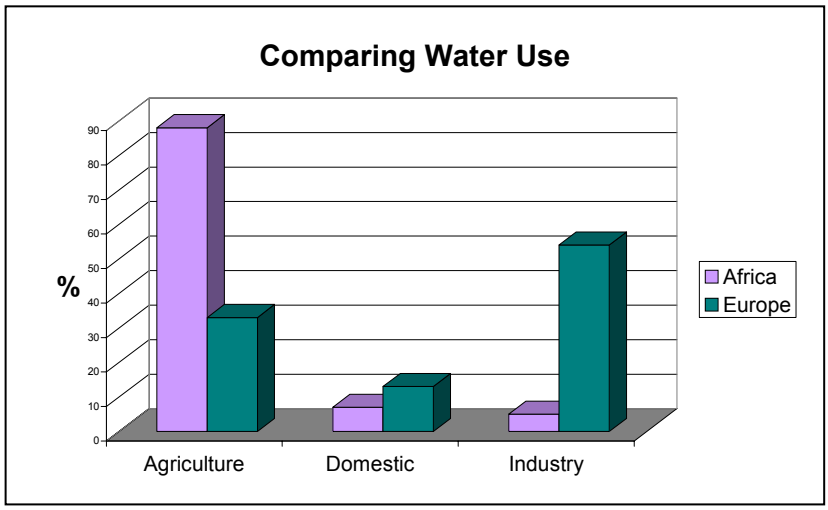
  Rainfall, temperature and humidity can be recorded at school and compared with the long term averages. Consider ways in which temperature and humidity could impact on water supply. Discuss the variability of weather and the difficulty in measuring climate change.

Appendix 8:Global Water Use

Water is Vital

◊ All Living things need water.

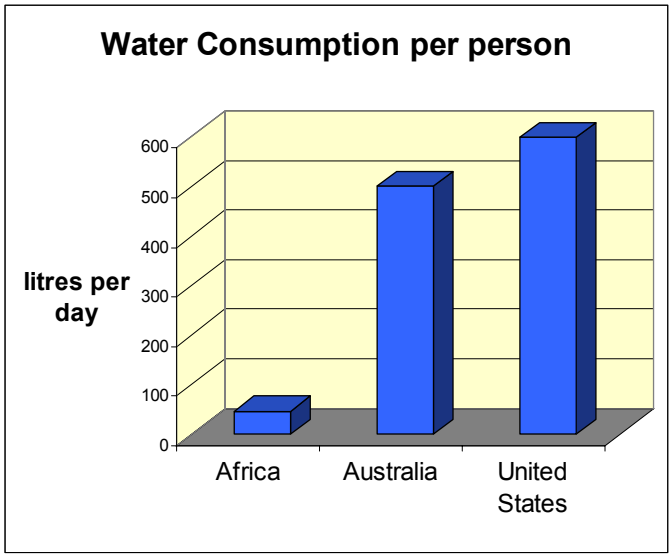
◊ People use water for many purposes: drinking, cooking, washing, cleaning, growing crops, leisure activities, putting out fires, generating electricity, processing food, manufacturing and many other industries.



◊ In developed regions of the world most water is used in industry.

◊ In developing regions of the world people use much less water. Why?

◊ Two-thirds of the world's population, the majority in developing countries, get their water from public standpipes, community wells, rivers and lakes, or rainfall collected off roofs. Often rural people - usually women and girls - walk many kilometres and spend many hours fetching water for their households.



In Australia:

◊ 20% of water used in the home is for showering

◊ 25% is for outdoors and gardening

◊ 23% is for flushing the toilet (6 – 13 litres)

Appendix 9: Solving the water supply problem.

Some of the options often considered are:

- ***Groundwater*** - refers to any naturally occurring water found below ground level. Areas within the earth that trap groundwater are called aquifers. Extracting water from aquifers generally requires bores to be drilled into the ground, and so it is sometimes referred to as bore water. Groundwater from the Somersby Plateau is bottled and sold throughout Australia. In many cases, we still don't know how long it takes for the groundwater to replenish – it could be thousands of years. Extracting too much groundwater can impact on plants and animals that rely on it.
- ***Desalination*** - a process that removes salt from seawater, brackish water or reclaimed water, to make it suitable for drinking. The process is extremely expensive to build and maintain and requires huge amounts of energy resulting in lots more greenhouse gases causing more climate change (more frequent and severe drought on the east coast of Australia is predicted) – at best a temporary solution as a last resort. Its proponents argue that it improves water security because salt water will never run out.
- ***Recycle Waste water*** - Water recycling is the process of re-using treated wastewater as a substitute for town water supply. It is mostly used for non potable purposes such as cooling and irrigation. Some new residential areas are required to provide separate plumbing so that this water can be used in toilets and washing machines. It is possible to treat wastewater to a potable standard using the desalination process. This is much cheaper than treating sea-water because treated wastewater contains much lower concentrations of dissolved impurities. In Australia there are problems getting public acceptance for this process even though the treated water would be mixed with the dam water supply.
- ***Other Dams*** – flooding behind the dam wall, results in a loss of habitat and in some places whole communities are displaced (Three Gorges Dam in China and the Aswan Dam in Egypt). Below the dam wall there is a much reduced flow and this impacts on the downstream environment. It's also not always possible to find a suitable location for a dam; geology, topography, social disruption and rainfall considerations all need to be considered.
- ***Water Tanks on homes and buildings*** –increases the water supply catchment area. An added advantage on the Central Coast is that this increase is into areas that receive a much higher rainfall as most people live on the wetter coastal belt. Apart from reducing the demand on the town water supply system, capturing roof water also reduces the stormwater runoff (which usually is a good thing).

Appendix 10: **Water Resources and Funding**

Community Water Grants are a federal government initiative that provides $200 million over 5 years for projects that will result in wise water use and involve local communities. In the first round $4.2 million went to 134 NSW public schools including 12 on the Central Coast. The average grant was $35000.

Council Guidelines for Provision of Water Tanks to Schools (2006)
Your local council is supporting water saving projects including water tanks. Gosford and Wyong Councils are each offering ten grants to schools / year. They will supply and install a water tank up to 11,000 litres capacity, fitted with a first flush device, to collect rainwater for non-potable uses within the school. The total value of this offer including supply and installation may be up to $5,000. Schools may also be eligible for a pump to be installed along with the tank. **To take advantage of this offer schools must have a water wise (use) policy.** Other water saving initiatives eg waterless urinals, mulching gardens etc may also qualify for council support. Contact your council to find out more. Phone Wyong Council's Catchment Management Officer, Ken Brookes, on4350 5220, or email brookesk@wyong.nsw.gov.au. In Gosford Council district phone 43681933

A water wise policy includes:

A water education programme in the school using resource material such as provided in this guide. Other resources are available from Sydney Water via their website at:
www.sydneywater.com.au/EnsuringTheFuture/WaterSchool/TeachersResources.cfm
with information and activities based on:

- Precious water
- Water and how we use it
- Managing the water supply
- School water audit
- Monitoring water use
- How to save water
- Saving water at home
- Use of native plants and mulching in gardens to reduce water needs.
- Installing water saving devices on all outdoor taps.
- Installing timers or automatic controllers on irrigation systems.
- Installing dual flush toilets.
- Involvement of all classes' years K to 6 in various aspects of the policy.

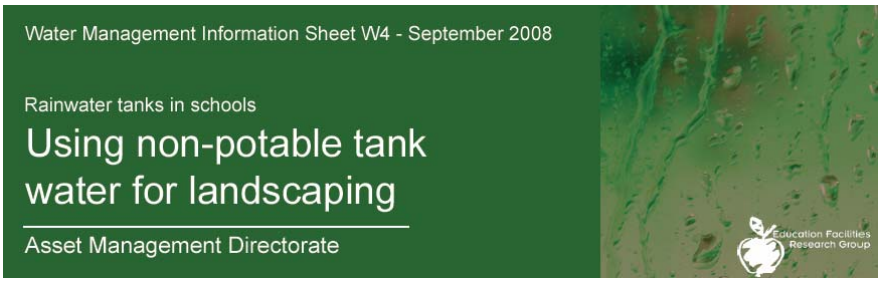
Rumbalara Environmental Education	www.rumbalara.eec.education.nsw.gov.au
Sydney Water	www.sydneywater.com.au

DET – Asset Management Fact Sheets

as at 1st March 2009

Go to:

https://detwww.det.nsw.edu.au/assetmanagement/envisust/solar2.htm



Appendix 11: Water Use Plan- Curriculum Links

Add curriculum links relevant to the learning stage of the students conducting the audit

ACTIVITIES associated with the School Water Plan	CURRICULUM LINKS
Discuss where our water comes from. Locate Mangrove Creek Dam on a map. Define the catchment area.	
Analyse the school Water Bills. Describe and explain consumption patterns.	
Read the school water meters to measure daily and weekly consumption.	
Count and record the water outlets (taps, toilets etc) in each area of the school.	
Estimate water loss over time from a dripping tap.	
Measure the volume of water used in various activities eg toilet flush, washing hands.	
Interview the general assistant, cleaner, principal etc about water use practices (e.g watering systems, how paths are cleaned)	
Research a variety of water saving devices	
Deliver a report on water audit investigations	
Discuss ways of reducing the schools water consumption and write up recommendations for a water action plan	
Implement and monitor a water action plan	
Describe and compare the water supply, stormwater and sewerage infrastructure.	
Research water supply and consumption in other countries	