



SWEP **introduction**

Data Logger Curriculum Module

Resources and educational materials
for teachers and students.



Acknowledgement of Country

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

Schools Water Efficiency Program (SWEP)

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Introduction

About SWEP

The [Schools Water Efficiency Program \(SWEP\)](#) is a voluntary program open to all schools within Victoria.

SWEP enables schools to continuously track their water consumption by using data logger technology. The school's data can be accessed by facility managers, teachers and students through an interactive website.

SWEP enables schools to monitor water usage and detect leaks so they can be rectified, allowing schools to save water and in most cases save money as well.

The program also provides students with an opportunity to learn about water efficiency through maths concepts such as measurement and data in a tangible and realistic environment.

Using data loggers in the classroom

This resource provides educational materials to support schools that have been fitted or have existing data loggers.

The information provided by the data logger can serve as a practical tool for learning activities and a powerful tool for students to develop water conservation strategies in their school; additionally it's also an important tool to assist with the management of the water use within the school, such as identifying leaks.

There are many different types of data loggers and service providers. While each logger type works slightly differently, the information can be uploaded to a central server and can be securely accessed by each school through a personalised domain provided at activation through SWEP.

The learning materials in this resource are separated into Primary and Secondary sections, however it is at the teacher's discretion as to how they apply the lessons and to which year levels they make them available.

The **SWEP primary educational resources** provide a sequence of lessons which utilise the SWEP website and real-time data, then extend students into additional learning, with a focus on sustainability and community action. The lessons give students insights and knowledge that empower them to take simple, tangible actions, to improve sustainability within their own lives, schools and communities.

Within the **SWEP secondary educational resources**, teachers can choose from:

- curriculum specific Secondary Lessons linked to content descriptors in the Year 7 and 8 Maths, Geography and Science curriculum areas
- cross curricular Secondary Activities to be utilised in a variety of contexts across all year levels, e.g. within the classroom, student representative councils, sustainability action groups, Vocational Module classes, Resource Smart Schools Water module, etc.

All educational materials have strong links to the Victorian and Australian curriculum (see pages 10–13 for further information on the links covered).



A pilot program conducted with 45 schools found that schools that used their data loggers as a learning tool (in the classroom) had a significantly greater reduction in water use than schools that did not use this data with students!

What is a data logger?

Your school has been fitted with a water data logger. This is a device that is attached to your school's water meter. It continuously records your school's water consumption. The information from your school's data logger is sent to the SWEP website.

www.myswep.com.au.

You can login to find out important information about how much water your school is using.



How do data loggers work?

Data loggers measure how much water your school uses across certain intervals of time, such as 15 or 30 minutes, hourly, daily, monthly, or annually.

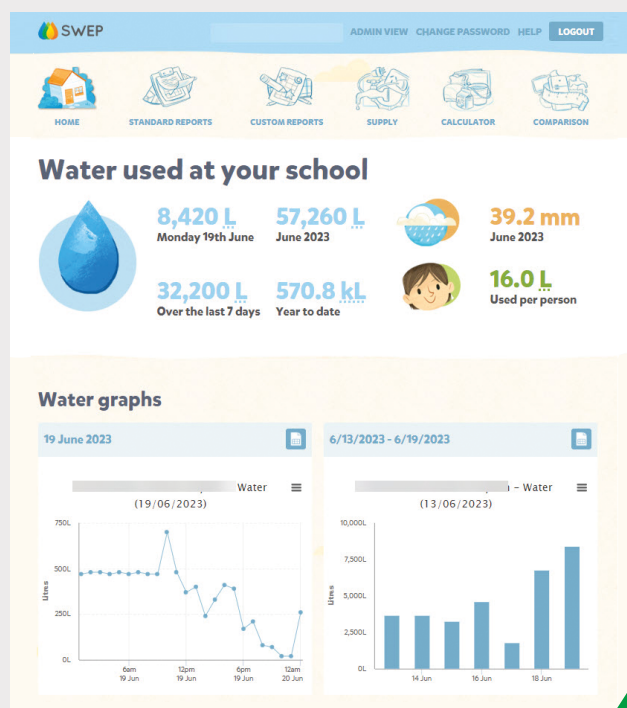
More information about data loggers

A data logger is a device to continuously record the data from a water meter or other type of meter. Once a data logger is attached to the school water meter via a probe called a read switch it records the pulses of the water meter. A pulse typically detects water usage in intervals of 1, 5, 10, or 100 litres. Each time this amount of water passes through the meter the data logger records the water usage on its internal memory.

SWEP data loggers are configured to record this information in 15 minute intervals. On a daily basis (usually midnight) the data logger transmits the data collected over the past 24 hours to a central server which translates and configures the data so it can be viewed by schools on a dedicated SWEP website.

When you log in to the [SWEP website](http://www.myswep.com.au) you can access data which shows how much water your school is using now and how much water your school has used in the past. You can make data comparisons across days, weeks, and months.

This data has helped many schools improve their water saving initiatives and save money on their water bills.



The SWEPP website

The SWEPP website myswep.com.au was developed to assist facility managers, teachers and students of a school to interpret the information collected by the school's data logger in a clear and engaging way.

The banner features the SWEPP logo and navigation links: HOME, ABOUT, LEARN MORE, CONTACT, SIGN UP, and LOGIN. The main heading is "Schools Water Efficiency Program" followed by "Find leaks, save water and promote water education in your school". Below this are four columns with icons and text:

- What is SWEPP?**
The Schools Water Efficiency Program provides data loggers to all Victorian schools to continue the education and demonstration of water efficiency in practice.
- What's involved?**
Installation is quick and easy with data loggers fitted in just minutes, there's no need for the water to be turned off so installation can happen at any time.
- Makes learning fun**
An exclusive, program specific curriculum resource is available providing relevant water efficiency activities for students.
- Getting started**
Register your school to become one of the first in the state to access tailored materials and personalised information. [Sign up to get started](#)

Homepage

When you log in to the website for your school, you will be immediately able to access valuable water use information via a dashboard. This dashboard provides you with a range of information and the menu to other data and related information about your schools water use.

The site will give you access to graphs and raw data showing the water consumption of your school. This information can be used to assess the schools water use over time, check for possible leakage, use in classroom activities and compare your schools with other schools.

The dashboard includes a top navigation bar with links: ADMIN VIEW, CHANGE PASSWORD, HELP, and LOGOUT. Below this is a menu with icons for HOME, STANDARD REPORTS, CUSTOM REPORTS, SUPPLY, CALCULATOR, and COMPARISON. The main section is titled "Water used at your school" and displays four statistics:

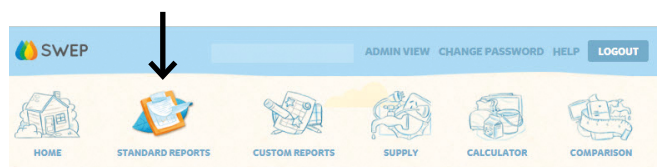
- 8,420 L Monday 19th June
- 57,260 L June 2023
- 39.2 mm June 2023
- 32,200 L Over the last 7 days
- 570.8 kL Year to date
- 16.0 L Used per person

Below the statistics are two graphs under the heading "Water graphs":

- 19 June 2023**: A line graph showing water usage (L) over time (6am to 12am) for 19/06/2023. The y-axis ranges from 0L to 7500L.
- 6/13/2023 - 6/19/2023**: A bar chart showing water usage (L) over time (13/06/2023) for the period 6/13/2023 - 6/19/2023. The y-axis ranges from 0L to 10,000L.

Standard reporting

This section of the website provides graphs which are interactive and allow you to view the most recent day's data, the past 7 days, past 30 days, and year to date.



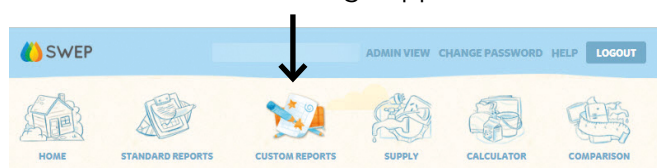
Standard Reports



Custom reporting

The custom reporting function also allows you to select the date range, unit of measurement and time period for each data set as required and exports your data to Excel.

You will be able to observe spikes in water use, usually corresponding to recess and lunch time when lots of toilet flushing happens!



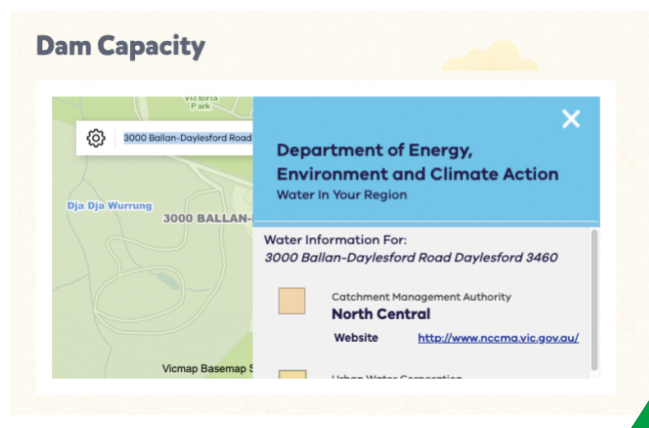
Custom Reports

Water supply

The water supply tab provides access to an interactive map supported by the Department of Energy, Environment and Climate Action (DEECA). The water supply map provides information on Dam storage levels across Victoria.

In addition to these functions weather observations from the schools nearest Bureau of Meteorology weather station are also provided, this includes rainfall and temperature observations for the last 30 days.

A drop-down menu on this site also provides a link to all water corporations (urban and rural), catchment management authorities and irrigation allocations for irrigation districts across Victoria.



Water calculator

The water calculator is designed to provide more insight into the schools usage and break that into more tangible units of measure that students can easily identify with.

Being able to understand how much water has been used either in the last day, week, and month or for the year to date is importantly supported by the further exploration of how this relates to household items such as buckets of water. In addition to these household items there is a secondary unit of measure which is designed to provide students with an introduction to embodied water by touching on the healthy drinking requirements of people.

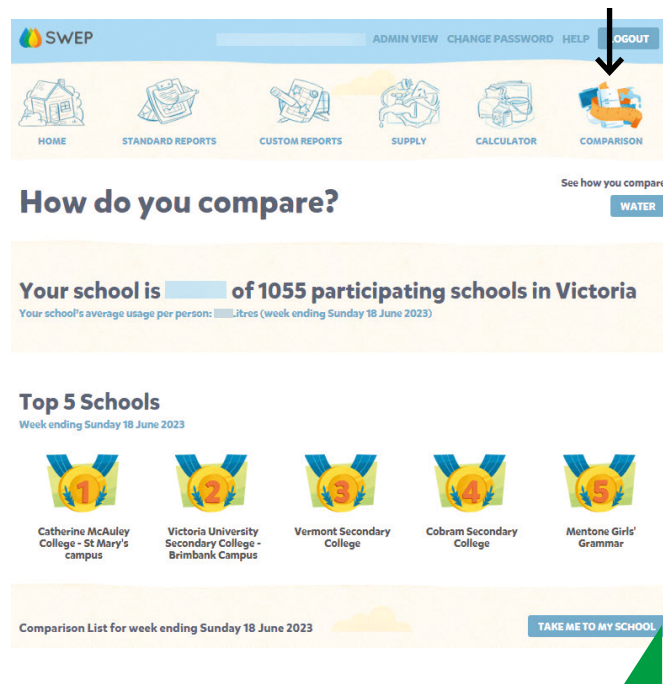


Comparison

Comparison reporting is only available to schools that have elected to share their monthly 'average usage' results with other schools, if your school has elected not to share this information then you will not be able to view this tab.

Changing the schools profile so that this data can be shared can only be done by the schools SWEP administrator.

Comparison reporting provides a per capita water usage figure for each participating school, meaning smaller schools are not at a disadvantage to larger schools and vice versa. Arrows located next to the ranking number indicate if the school has improved or worsened in its comparative water use from the previous month. A map of the DEECD education regions provides an understanding as to which regions have the highest per capita water use in comparison to others.



Detecting unusual water usage

Detecting unusual water usage at your school can save thousands of litres of water a year – and money too!

You might have an underground leak, a faulty tap or toilet or an irrigation system might be on that you don't know about. Your data logger will be able to help you detect these leaks by measuring water flow during what should be a non-consumption period (e.g. midnight to 2am or during the weekend). The data can then be used to quantify the amount of water that could be lost over a year or other period of time if the situation isn't resolved.

Action should then be taken to find water loss, which could either be:

Above ground (e.g. leaking taps or toilet cisterns, or irrigation systems)

Toilet and tap leaks are fairly simple to locate. Leaking toilets, for example, can be identified through listening for water running or placing 6-8 drops of food colouring in the cistern and

waiting for five minutes without flushing the toilet. If the colouring appears in the toilet bowl, the cistern has a leak and should be repaired. Irrigation systems are usually characterised by a large spike in water use early in the morning or late in the evening, when typically these activities occur.

Below ground (e.g. In your water pipe system)

These types of leaks are harder to find, but are sometimes evident at the surface. They can be identified by excessively soft soil, very green grass in summer, or wet concrete. If they are fast leaks, you can sometimes hear them too. In some cases, you will need to engage a specialist to assist in finding the leak, such as an acoustic leak detection plumber to detect and fix these leaks.

CASE STUDY CARWARTHA COLLEGE

Before installing data loggers on their water meter, Carwartha College used 15 million litres of water (75 litres/student/day), costing the school around \$30,000 per year. Using the information from their data logger, they detected that there was a significant water leak during typically non usage periods (10pm – 6am).

The school began by inspecting taps and located around the school but were unable to find the leak. They enlisted the help of a specialist acoustic leak detection service who found that there was a leak under a concreted area.

Fixing the leak required excavation but the results were worth the trouble. The school now uses 3.3 million litres of water each year (16.5 litres/student/school day), a saving of \$23,000 each year.

The school does still have some ongoing leakage issues, but tries to keep on top of their aging water infrastructure as best they can.

Application of the data logger technology in the classroom, including in the Year 7 Sustainability Unit, has ensured that the students are taking ownership for the way they use water at school.



SWEP - Curriculum connections

The following Victorian and Australian curriculum connections directly relate to the Primary and Secondary educational resources provided for SWEP schools.

Victorian primary resources, Level 3-6

ACTIVITY	LEARNING AREAS							CAPABILITIES		CCP*
	Mathematics	English	Science	Health and Physical Education	Digital Technologies	Geography	Civics and Citizenship	Critical and Creative Thinking	Ethical Capability	Sustainability
Activity 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Activity 2	✓	✓	✓		✓					✓
Activity 3	✓		✓		✓					✓
Activity 4	✓		✓		✓	✓				✓
Activity 5	✓		✓		✓	✓				✓
Activity 6	✓		✓			✓				✓
Activity 7	✓	✓	✓	✓		✓	✓	✓	✓	✓
Activity 8 (optional)	✓		✓		✓	✓	✓	✓	✓	✓

* Cross Curriculum Priorities

Australian primary resources, Level 3–6

ACTIVITY	LEARNING AREAS						CAPABILITIES		CCP*
	Mathematics	English	Science	Health and Physical Education	Humanities and Social Sciences (HASS)	Digital Technologies	Critical and Creative Thinking	Ethical Understanding	Sustainability
Activity 1	✓	✓	✓	✓	✓	✓	✓	✓	✓
Activity 2	✓	✓	✓			✓			✓
Activity 3	✓		✓			✓			✓
Activity 4	✓		✓		✓	✓			✓
Activity 5	✓		✓		✓	✓			✓
Activity 6	✓		✓		✓				✓
Activity 7	✓	✓	✓	✓	✓		✓	✓	✓
Activity 8 (optional)	✓		✓		✓	✓	✓	✓	✓

* Cross Curriculum Priorities

Victorian secondary resources

Mathematics Yr 7	Mathematics Yr 8	Geography Yr 7/8	Science Yr 7/8
<ul style="list-style-type: none"> Identify and investigate issues involving numerical data collected from primary and secondary sources (VCMSP268) Construct and compare a range of data displays including stem-and-leaf plots and dot plots (VCMSP269) Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (VCMSP270) Describe and interpret data displays using median, mean and range (VCMSP271) 	<ul style="list-style-type: none"> Distinguish between a population and a sample and investigate techniques for collecting data, including census, sampling and observation (VCMSP297) Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (VCMSP298) Explore the variation of means and proportions of random samples drawn from the same population (VCMSP299) Investigate the effect of individual data values including outliers, on the range, mean and median (VCMSP300) Choose appropriate units of measurement for area and volume and convert from one unit to another (VCMMG286) 	<ul style="list-style-type: none"> Human causes of land degradation, the effects on landscape quality and the implications for places. (VCGGK119) The challenges of managing and planning Australia's urban future (VCGGK126) Influence of accessibility to services and facilities; and environmental quality on the liveability of places. (VCGGK112) Classification of environmental resources and the forms that water takes as a resource (VCGGK105) Nature of water scarcity and the role of humans in creating and overcoming it, including studies drawn from Australia and West Asia and/or North Africa (VCGGK108) 	<ul style="list-style-type: none"> Water is an important resource that cycles through the environment (VCSSU101) Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge (VCSIS107) Construct and use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships (VCSIS110)

These curriculum connections refer to the curriculum specific Secondary Lessons, developed by SWEP to be utilised within the Year 7 and 8 Mathematics, Science and Geography curriculum.

Australian secondary resources

Mathematics Yr 7	Mathematics Yr 8	Geography Yr 7/8	Science Yr 7/8
<ul style="list-style-type: none"> Identify and investigate issues involving numerical data collected from primary and secondary sources (ACMSP169) Construct and compare a range of data displays including stem-and-leaf plots and dot plots (ACMSP170) Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171) Describe and interpret data displays using median, mean and range (ACMSP172) 	<ul style="list-style-type: none"> Investigate techniques for collecting data, including census, sampling and observation (ACMSP284) Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (ACMSP206) Explore the variation of means and proportions of random samples drawn from the same population (ACMSP293) Investigate the effect of individual data values, including outliers, on the mean and median (ACMSP207) Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195) 	<ul style="list-style-type: none"> Human causes and effects of landscape degradation (ACHGK051) Management and planning of Australia's urban future (ACHGK059) The influence of environmental quality on the liveability of places (ACHGK045) Classification of environmental resources and the forms that water takes as a resource (ACHGK037) The nature of water scarcity and ways of overcoming it, including studies drawn from Australia and West Asia and/or North Africa (ACHGK040) 	<ul style="list-style-type: none"> Some of Earth's resources are renewable, including water that cycles through the environment, but others are non-renewable (ACSSU116) Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSI124) Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence (ACSI130) Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate (ACSI129)

These curriculum connections refer to the curriculum specific Secondary Lessons, developed by SWEP to be utilised within the Year 7 and 8 Mathematics, Science and Geography curriculum.



SWEP

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EFFICIENCY PROGRAM

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Energy,
Environment
and Climate Action