



PUFFING BILLY RAILWAY POST- EXCURSION RESOURCES

INNOVATION STATION

CONSERVATION IN ACTION

LEVEL

Level 7 – Level 8

ACTIVITY DESCRIPTION

Students learn about the amount of rubbish they generate and the implications of that rubbish. They compare the waste management systems at Puffing Billy Railway with their school waste systems. Students learn about the five R's (Refuse, Reduce, Reuse, Repurpose, Recycle) as they investigate, collect, analyse and interpret data and recommend solutions. They understand that they are powerful consumers, and their actions reflect, and are the key to changing behaviour for the future.

THEME

- Impacts on Biodiversity
- Waste Management
- Conservation in Action

MATERIALS REQUIRED

- Rubbish items dropped in the yard from school lunch, on one day (students to collect).
- Rubbish items dropped from visitors from Puffing Billy Railway, one day (students to collect).
- Action Plan proposal worksheets
- Waste Audit worksheets
- Large buckets to collect rubbish
- Large tarps
- Gloves
- Tongs
- Scales for weighing rubbish
- Writing materials
- Student workbooks
- Art and craft materials
- Access to the Internet

SAFETY: Be mindful that all items used in the activity, need to be safe. Remind students not to collect anything sharp or other nasties like animal poo. When sorting waste all students should use gloves and tongs.

INSTRUCTIONS

In this activity, students collect, examine, and weigh the rubbish that has been dropped in the school ground at lunchtime and compare it to rubbish that has been dropped by tourists at Puffing Billy's Emerald Lake at lunch time.

STEP 1: DEVELOP AN ACTION PLAN – Photocopy and distribute copies of the “Action Plan Proposal” worksheet to each student.

STEP 2: THE IMPACTS OF RUBBISH - Discuss the contributing factors to reduced biodiversity in the natural areas. Discuss the recent excursion to Puffing Billy Railway and the impacts of rubbish in the area and potential impacts of rubbish in the future.

STEP 3: THE TASK – Photocopy and distribute copies of the “Waste Audit” worksheet to each student. Outline the task, answer student questions and arrange students into working groups. Instruct students to use the large buckets to collect all the school yard rubbish they can find that has been dropped in the school yard at lunchtime. If your school grounds are large you may need to assign different school yard areas to each group. Assigning different school yard areas to each group also provides a sense of ownership and opportunity to develop extension activities, such as monitoring rubbish behaviour of students, re-vegetating and rubbish bin allocation in the future. Although students are working in groups, all the data will be collated together. Individual group data will be used to locate any rubbish “hotspots” in the yard.

STEP 4: PREDICTIONS – Students make predictions about the types of rubbish they think will be collected and the total weight of the rubbish collected. Write some of these predictions on the board.

STEP 5: COLLECTION – Each group establishes a sorting area in the classroom. They use tarps to spread out on the floor. Depending on class sizes, the rubbish sorting can be achieved as a whole group. Once students are aware of safety considerations and have their gloves on, they can commence their school yard rubbish collections.

STEP 6: AUDIT – Once the rubbish collections are complete, students sort their individual piles of rubbish into the following categories: cardboard, hard plastics, soft plastics, aluminium, paper, steel, organics, other.

STEP 7: DATA – Students record the contents of their collections using the “Waste Audit” worksheet. They weigh their individual piles of rubbish, using a scale and record their finding.

STEP 8: THE STATISTICS – Write the following statistics on the board.

Australians produce 540kg of household waste per person, each year. That's more than 10kg for every single person, every single week. Of the estimated 67 million tonnes of waste Australians generated in 2017, just 37 million tonnes was recycled, leaving 21.7 million tonnes disposed of in landfill. It's estimated about 130,000 tonnes of Australian plastic ends up in our waterways and oceans each year.

Reference: Clean up Australia

Ask the students to determine the following:

- How much rubbish did the class collect all together?
- How much waste is generated each week? Remember this is just rubbish that has not made it to the bins, not the total amount of rubbish that is generated.
- Where does this discarded rubbish end up?
- Is this a problem?
- Could we apply the five R's to any of the rubbish?
- What can we do?
- What actions are we going to take?

STEP 9: ANALYSE DATA, INTERPRET INFORMATION, DRAW CONCLUSIONS

Ask the students to create graphs and charts using their data from both school and Puffing Billy Railway collections. The graphs might include a pie chart or bar graph of the amount of weight each material measured. One chart for each site. Then discuss the following questions:

- What were the five most common items found?
- Was there a difference between the two sets of results? If so, why might this be the case?
- Were there any items that could have been recycled or composted?
- How much money does the school spend on rubbish removal each year?
- What could the school do to prevent this from happening?
- What else did you notice that was interesting about the contents of your findings?
- What are some ideas for improving the waste management system in the school?

STEP 10. TAKE ACTION

Students then write articles or learning stories about their waste action plans and achievements. These can be published on the school website or students can create presentations to share with the school community at an assembly, open day or school council meeting. The learning stories could include:

- Waste findings and achievements (where you started, how far you have come)
- The steps in meeting these findings and achievements
- Inspiration, help and advice
- Supporting images
- School waste goals for the future
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SUGGESTIONS FOR ASSESSMENT

Ability to contribute to a group task. Ability to make predictions, carry out research, data collection, interpret, analyse and draw conclusions. Successful completion of an article or learning story.

CURRICULUM LINKS

MATHS

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)

SCIENCE

Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge (VCSIS107)

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (VCSIS108)

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)

Use scientific knowledge and findings from investigations to identify relationships, evaluate claims and draw conclusions (VCSIS111)

Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method (VCSIS112)

Communicate ideas, findings and solutions to problems including identifying impacts and limitations of conclusions and using appropriate scientific language and representations (VCSIS113)

BACKGROUND INFORMATION

WASTE GENERATED PER PERSON

Between 1996-97 and 2006-07, the volume of waste produced per person in Australia grew at an average annual rate of 5.4%. In 1996-97, Australians generated approximately 1,200kg of waste per person. By 2006-07, this had increased to 2,100kg per person.

International evidence suggests that economic growth contributes to growth in waste generated per person (Productivity Commission 2006). Australia's economic prosperity over the past couple of decades has contributed to the growing generation of waste. Australians are among the highest users of new technology, and waste from obsolete electronic goods (e-waste) is one of the fastest growing types of waste (ABS 2006).

Reference: Australian Bureau of Statistics 2006

AUSTRALIANS CREATE 67 MILLION TONNES OF WASTE EACH YEAR. HERE'S WHERE IT ALL ENDS UP!

The most up-to-date stats show Australians generated 67 million tonnes of waste in 2016-2017. That's 2.7 tonnes, per person, per year — roughly the weight of an African forest elephant. (ABC News: Andrew Harrison)

Of that, about 54 million tonnes is known as "core waste" and is dealt with by the waste and resource recovery industry. The rest is things like ash from electricity generation, mud from refining, manure from farming and liquid waste like sewage — stuff that can't be picked up by a rubbish truck on bin day.

While a lot of the focus is on households, more than a third of our waste comes from the construction and demolition industry, and the same amount comes from the commercial and industrial sector.

Compared with other similar developed countries, the Department of Environment says we generate "more waste than the average" and recycle "a little less than the average".

"We have way too much of a view that it's just waste and you just throw it out," says Gayle Sloan, the CEO of the Waste Management Association of Australia.

WHERE'S IT ALL GOING?

Jenni Downes, a researcher at Monash University's Sustainable Development Institute, says what happens once rubbish is put in a bin remains a mystery for many people.

She says a big part of that is the fact that waste companies have "designed their services to be almost invisible". "They've tried to make it as simple and convenient for householders so that you put your waste in the bin, and it disappears. Poof, it's gone."

For what goes into general waste bins the outcome is pretty simple — in most instances, it goes straight into landfill. Of the 67 million tonnes of waste we created in 2016-2017, we recycled 37 million tonnes. (ABC News: Andrew Harrison) A large portion of that — about 6.7 million tonnes — is organic waste like food and garden waste, which creates methane-rich greenhouse gases as it decomposes.

Only about 2 per cent of our waste is converted to energy, a much lower rate than some European countries. And it's estimated about 130,000 tonnes of Australian plastic ends up in waterways and oceans each year.

The three main ways it ends up there, according to WWF, are littering, products like wet wipes being flushed and plastic flying away from landfill processing.

Reference: abc.net.au



STEP ONE: REFUSE

Refuse: the first element of the 5 R's hierarchy. Learning to refuse waste can take some practice but incorporating this step is the most effective way to minimize waste.

STEP TWO: REDUCE

Reduce the use of harmful, wasteful, and non-recyclable products. Reducing dependency on these kinds of products results in less waste materials ending up in landfill and the associated negative environmental impacts.

STEP 3: REUSE

Single-use plastics have created a “throw-away” culture by normalizing consumer behavior of using materials once and then throwing them away. The rate at which we consume plastics has become unimaginable, and the plastic crisis has become one of the world’s greatest environmental challenges. In an effort to reduce waste, reuse items throughout the workplace instead of buying new ones.

STEP FOUR: REPURPOSE

For every item that can't be refused, reduced, or reused, try repurposing it. Many people in the green community refer to this method as upcycling. You may be surprised to learn how many common office products serve more than one purpose. Sometimes it requires using some creativity, but the possibilities are endless.

STEP FIVE: RECYCLE

Last but definitely not least: recycle. Once you have gone through all of the other R's, recycling is the most environmentally friendly waste disposal method. If your business does not already, start collecting cardboard, mixed paper products, commingled materials (plastics, aluminum, glass) and organics.

Reference: Roadrunner

ACTION PLAN PROPOSAL WORKSHEET

Name:

Project title:

School:

1. WHAT IS BIODIVERSITY?**2. LIST 3 HUMAN ACTIVITIES THAT CAN DAMAGE THE ENVIRONMENT AND BIODIVERSITY?****3. LIST 3 TYPES OF POLLUTION****4. IN TERMS OF WASTE MANAGEMENT, WHAT ARE THE FIVE R'S?****5. DESCRIBE THE ENVIRONMENTAL ISSUE/FOCUS FOR YOUR PLAN****6. NAME 3 THINGS YOU CAN DO TO PROTECT THE ENVIRONMENT AND INCREASE BIODIVERSITY****7. WHY IS THIS ISSUE/FOCUS PARTICULARLY A PROBLEM FOR YOUR SCHOOL/LOCAL COMMUNITY?****8. WHAT IS THE AIM OF YOUR PROJECT?****9. WHAT IS YOUR PREDICTION?**

WASTE AUDIT WORKSHEET

ITEM	GROUP RESULTS- MEASURED IN GRAMS/ KILOGRAMS	WHOLE CLASS TOTAL MEASURED IN GRAMS/ KILOGRAMS	INDICATE WHICH OF THE FIVE R'S COULD BE USED
CARDBOARD – Pizza box, cardboard box.			
SOFT PLASTIC - Small pieces of plastic wrappers (such as lolly and chip wrappers), plastic straws, icy pole wrappers			
HARD PLASTIC – plastic containers, yoghurt containers, drink bottles.			
PAPER - Sandwich wrap, paper tissues or towel, sheets of paper, icy pole sticks.			
ORGANICS - Whole or partly eaten pieces of raw fruit or vegetable, pieces of cake, bread and pastries.			
ALUMINIUM – foil chip packets, aluminium foil, soft drink cans.			
STEEL – Steel lids, containers			
OTHER – Clothes, batteries			
TOTAL			