

Learning Area: Water Quality		
Success Criteria:		
Introduction	Activity	Summary
<p>Make a class list of all the water in our environment.</p> <p><b>How much of this water can we see? Highlight this water</b></p> <p><b>What do we know about ground water?</b></p> <p>Read info sheet (<i>appendix 1</i>)</p> <p>Demonstrate using a diagram how the over use of ground water effects our environment (<i>appendix 2</i>)</p> <p>Using the same diagram discuss the way in which ground water becomes contaminated.</p> <p>Now lets take a look at how you can easily demonstrate this to your family tonight.</p>	<p>Students can carry out this experiment in pairs or the teacher can demonstrate to whole class using a larger container.</p> <p>For students working in pairs use a glass – for a whole class demonstration use a cut-off clear drink bottle.</p> <ul style="list-style-type: none"> <li>• This glass represents under-ground.</li> <li>• The bottom of the glass is an impermeable layer of rock – it will not let anything through. (<i>locate on introduction diagram.</i>)</li> <li>• On top of the impermeable layer is a layer of gravel or open rock. (<i>locate on introduction diagram.</i>)</li> <li>• Put a thick layer of lollies (jelly-like) to represent the gravel layer. (<i>locate on introduction diagram.</i>)</li> <li>• Slowly add some lemonade, until it reaches the top of the lolly layer.</li> <li>• <b>Where is the liquid going?</b></li> <li>• <b>Does it fill all the spaces between the lollies/rocks?</b></li> <li>• Now put a layer of ice-cream on top – you’ll need to pat it down a bit to form a proper layer, but leave some gaps – partly to let liquid through later, partly to let straw through later.</li> </ul> <p>This ice-cream represents a confining layer of rack above the groundwater. (<i>locate on introduction diagram.</i>)</p>	<p>Draw up this experiment.</p> <p>Use diagrams, pictures, photos and clear labels.</p> <p>Take care over order and give a short explanation for what is being demonstrated at each stage.</p> <p><b>Challenge: Run this demonstration with your family tonight.</b></p> <p>Report back on how effective it was tomorrow.</p>

- Put a layer of chocolate chips and hail (sprinkles) on top of the ice-cream.
- This represents the soil. (*locate on introduction diagram.*)
- We have now created an aquifer, a reservoir of groundwater trapped above impermeable rock and under an upper layer.
- Add some food colouring to some (not all) of the remaining lemonade (or use another coloured drink)
- This represents pollution in the surface water.
- **What are some pollutants that can contaminate surface water?**
- Pour coloured lemonade slowly onto the top of the ice-cream.
- Watch as some of the pollution spreads out, and may even seep down through weaknesses into the groundwater.
- **What is happening?**
- Now sink a well into the groundwater! (If you are demonstrating to the whole class use a volunteer) To do this gently push a drinking straw down through the centre (not the edge) of the confining ice-cream. Suck gently, to remove only some of the water in the aquifer.
- Notice how the water table drops.
- **What is happening to the watertable?**
  - *What can happen is that as the level of lemonade goes down, the ice-cream falls down the glass. Of course, the confining rock in real life does not obviously fall down as water is used up. This effect could be reduced by using a tapered glass.*
- **How is the polluted water getting into the groundwater?**
  - *The polluted water may end up in the well area, and in the groundwater, by leaking through the confining layer (ice-cream).*
- Stop extracting groundwater and pour some clear lemonade on top.
- This 'rain' should now seep through and recharge the aquifer.
- **What will happen to our aquifer if we suck up more lemonade than we put in?**
  - *It should be obvious that if you suck out more lemonade than goes in, the 'aquifer' will dry up.*
- Now take a spoon and eat the aquifer!!!

## Appendix 1: Water in the Environment

When we think of water in the environment, we normally think of surface water that we can see – streams, rivers, lakes, puddles, oceans. Yet much of the water that falls to Earth seeps down into the soil. It keeps on going down until it reaches rock that doesn't let it through (impermeable layer). The ground above the impermeable layer becomes saturated, a reservoir of water. Some groundwater has been in the ground for thousands of years. It is this groundwater that is sucked up through bores and pumps, and is used for irrigation, town water, etc; in fact most of what you buy as bottled water is ground water.

## Appendix 2: The Water Table

Because we can't see the water underground, we tend to take it for granted. Water seeping down from the surface can carry pollutants that contaminate the groundwater. If we pump out more water than goes in, the top level of groundwater (the water table) gets deeper. This can have a huge effect on the environment – a lower water table means that the roots of many plants cannot reach water, and streams can get smaller or dry up.

We need to manage groundwater resources, so that they are kept clean and accessible, without taking out more than goes in. To manage something, we need to understand how it works. We are going to build a water aquifer – one that we can eat!!