Lesson Plan

Discover Our Water

Grade: 7 & 8

How Do We Treat Wastewater?

Students will be able to:

- understand the wastewater journey from the sink to the sea
- recognise that we are all responsible for caring for our environment
- learn about the stages of treating wastewater

Lesson Details:

1. We all create wastewater.

We all use showers or baths, toilets, cook food, wash utensils and clothes, water gardens, wash cars. Water is used by all of us in many ways every day. We make water dirty and it is our responsibility to do what we can to ensure we are not contributing to additional pollution in wastewater.

Investigate the sources of wastewater and type from the home, from industry, from commercial businesses. For some ideas, take a look at TasWater's trade waste page on our website.

2. It's more than 90% dirty water - but what a cocktail!

Most of us would think immediately of human waste when we talk about wastewater. However, human waste is only a small component of what is received at a Sewage Treatment Plant.

A lot of wastewater is just that, dirty water from showers, washing machines, hairdressers etc. Wastewater also consists of greases, oils, chemicals, fats and also contains wipes, food scraps and wrappers, sanitary products, nappies etc. Why do the latter products end up in our sewerage systems?

Prior to the existence of Sewage Treatment Plants in Tasmania, most wastewater was either received into onsite septic tanks or just pumped out to sea. From the 1950's onwards Sewage Treatment Plants were constructed to receive predominately domestic waste and dilute, filter and disinfect nutrients, pathogens and chemicals, prior to releasing to the sea. Strict environmental conditions exist with regards to the quality of the effluent released into natural environments.

Explore with students the history of sewage treatment processes around the world.

Curriculum Links

Grade 7

Science
- ACSSU116
- ACSHE119
- ACHSE121
- ACSIS130
- ACSIS133

English
- ACELY1723
- ACELY1725
- ACELY1728

Geography
- ACHGK037
- ACHGK040
- ACHGS054

Maths
- ACMSP169
- ACMNA158

Grade 8

Science
- ACSHE135
- ACSHE136
- ACSIS145
- ACSIS148

English
- ACELY136
- ACELY1738

Geography
- ACHGK051
- ACHGK059
- ACHG062

Maths
- ACMMG175
- ACMNA187

Lesson Plan

Lesson Details continued:

3. So how is wastewater treated?

Wastewater treatment involves many stages, including biological processing before it is released into our seas and rivers, irrigated to land or reused.

The biological process helps to breakdown and remove substances in wastewater that could harm our natural environment.

Wastewater needs to be treated to ensure pathogens or disease causing substances are removed. So the goal of wastewater treatment is to reduce or remove nutrients, solids, organic matter, disease causing organisms and other pollutants.

There are five stages of wastewater treatment:

1. **Screening** - wastewater must be screened to remove larger objects that can damage the plant. Sticks, rags, dead animals, sanitary items, wipes, plastic bags and bottles.
2. **Aeration** - this is where the biological process kicks in - tiny organisms (bacteria) break down and eat the sludge. They require oxygen to thrive - so the wastewater is mechanically aerated with mixers.
3. **Clarification** - a clarifier further helps to settle out the sludge. Solid particles are attracted together and settle at the bottom of the tank. The wastewater is diverted to another process.
4. **Disinfection** - as the wastewater will still contain many nutrients and microorganisms, disinfection is required to remove them. This is usually by ultravoilet light which instantaneously neutralizes microorganisms as they pass by ultraviolet lamps submerged in the effluent. In some cases chlorination is used for disinfection.
5. **Sludge reduction and removal** - some plants will dewater the sludge and feed it into a digester. The digester helps to reduce the volume of sludge. Other plants will store the sludge in large lagoons to dry out. Eventually, sludge from either process is taken to landfill or re-used as an ingredient in fertilizers or for pasture improvement (under strict guidelines).

Lesson Reflection:

1. What shouldn't be flushed down your toilet or sink drain?
2. What is the composition of wastewater?
3. What is the natural process called which breaks down the sludge form of wastewater?
4. Name the stages of the wastewater treatment process.
5. How was wastewater treated in Tasmania prior to the 1950's?

Did you know?

Biosolids is the term used to describe the solid form of sludge that is produced at various stages of the wastewater treatment process.

More Information

Contact our Education Officers who can visit your classroom and share some engaging water activities with your students. Alternatively visit our website, complete an online requst form and our Education Officers will contact you.

Email: education@taswater.com.au

Website: www.taswater.com.au

Additional Activities

Take a closer look at the biological processes for breaking down sludge in the wastewater treatment process. What are these microorganisms that thrive on our waste? Discover their names, what they look like and their role in helping us deal with our sewage every single day. Contact our Education Officer for further information or resources supporting this activity.