

Lesson Plan 11: Domestic Wastewater Management**30 minutes total****Lesson Description**

This lesson explains the differences between blackwater, greywater, and overflow water. It focuses on the proper management of greywater and overflow water to protect public health and the environment. A demonstration is used to visually show what greywater looks like and how it is separated using a grease trap.

For blackwater management, see Lesson Plan: Human Excreta Management.

Learning Outcomes

At the end of this session participants will be able to:

1. List the three components of domestic wastewater: blackwater, greywater and overflow water.
2. Discuss the importance of properly managing greywater and overflow water.
3. Identify management options for greywater.
4. Identify management options for overflow water.

Materials

- Flipchart paper
- Tape
- Markers

Optional:

- Computer and projector
- PowerPoint: Domestic Wastewater
- Greywater demonstration materials:
 - Clear container (like a 1 litre plastic water bottle)
 - Water
 - Liquid dish soap
 - Cooking oil
 - Food scraps

Preparation

- Review topic in Technical Brief: Domestic Wastewater Management
- Write the heading “*Water Used in the Home*” on flipchart paper
- Write the heading “*Domestic Wastewater*” on flipchart paper. Underneath write the definitions of blackwater, greywater and overflow water.

- Write the heading “*Greywater Management*” on flipchart paper with the following bullets underneath:
 - *Source control*
 - *Treat*
 - *Reuse in agriculture*
 - *Reuse as toilet flush water*
 - *Dispose into the ground*
 - *Discharge into surface water*
- Write the heading “*Overflow Water Management*” on flipchart with the following bullets underneath:
 - *Reuse in agriculture*
 - *Dispose into the ground*
 - *Discharge into surface water*
- Optional: Write the learning outcomes on flipchart paper
- Optional: Practice doing the greywater demonstration to make sure that it works
- If using PowerPoint: Domestic Wastewater
 - Review the PowerPoint presentation
 - Print the speaker’s notes
 - Check that the projector is working
 - Cue the PowerPoint on the computer

Introduction**5 minutes**

1. Ask the participants to list all the different types of water that is used in the home. Record the responses on the “*Water Used in the Home*” flipchart.
 2. Select a type of water from the list. Ask the participants to use alligator arms to indicate how contaminated that type of water is. If they think the water is very contaminated then participants open their arms very wide. If they think the water is not contaminated and safe, then participants keep their arms closed. Participants open their arms a little bit if they think the water is somewhat contaminated. Repeat for all water types.
 3. Explain that all wastewater generated in the home is called domestic wastewater. Present the lesson description or learning outcomes.
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Domestic Wastewater**5 minutes**

1. Ask the participants to define blackwater. Share some responses and then show the definition of blackwater on the “*Domestic Wastewater*” flipchart.
 - *Human excreta mixed with toilet flushing water and materials used for anal cleansing, such as toilet paper.*
 - *Highest levels of pathogens from the feces.*
 2. Ask the participants to define greywater. Share some responses and then show the definition of greywater on the “*Domestic Wastewater*” flipchart. Discuss the characteristics of greywater.
 - *All other types of wastewater from domestic activities (e.g., laundry, dish washing, bathing, cleaning).*
 - *Usually has low levels of pathogens, especially compared to blackwater. Any pathogens are usually from cross-contamination with excreta. Fecal pathogens can end up in greywater through handwashing after defecation, washing children after defecation, and washing children’s diapers.*
 - *Greywater may also have other contaminants like oil, grease, soap, detergent or other household chemicals.*
 - *The amount of greywater produced depends on how much water a person uses in a day. A household with no water shortages and a piped supply typically produces about 90–120 litres/person/day. But this can be much less, especially in water scarce areas where people must fetch their water and use only 20–30 litres/person/day.*
 3. Ask the participants to define overflow water. Share some responses and then show the definition of overflow water on the “*Domestic Wastewater*” flipchart.
 - *Wastewater that has spilled from wells or water points.*
 - *Should have very low levels of pathogens. However, overflow water can quickly become contaminated with pathogens from human and animal feces when it is not well managed and causes standing water.*
 4. Explain that domestic wastewater includes blackwater, greywater and overflow water. This lesson is going to focus on the management of greywater and overflow water. Blackwater is discussed as part of the sanitation system to manage human excreta.
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Greywater Management**10 minutes**

1. Ask the participants to identify ways that greywater is currently managed in their communities.
2. Ask the participants to discuss the public health and environmental impacts when greywater is poorly managed.
 - *In urban and peri-urban areas of low and middle-income countries, greywater is most often discharged untreated into drains or sewers (provided they exist). This water then flows into surface water body, like a lake, river or ocean. This can lead to oxygen depletion, increased turbidity, and microbiological and chemical contamination of surface water.*
 - *In areas with no drainage or sewer system, a common practice is to simply dump the greywater onto the ground or street outside the home. This can lead to stagnant and smelly water that also provides a good breeding site for mosquitoes. It also negatively impacts the local living conditions.*
 - *Another practice is to dispose greywater in pit latrines. Sometimes the size of the latrine is designed to hold greywater. But usually this is not the case since most households just build their latrine big enough to collect excreta. Adding greywater can cause the pits to fill up faster than planned, which increases the frequency and cost to empty them. As well, putting untreated greywater into pit latrines causes them to smell and attracts flies and other insects.*
3. Show the “Greywater Management” flipchart. Discuss the options for treating, reusing and disposing greywater in ways that are the least harmful to people and the environment:
 - *Source control to reduce the amount of greywater contamination in the first place*
 - *Treat greywater by using primary (e.g. grease trap, septic tank) and/or secondary treatment technologies*
 - *Reuse greywater to irrigate household gardens and agricultural crops*
 - *Reuse greywater as toilet flush water*
 - *Dispose of greywater into the ground using a soak pit or infiltration trench*
 - *Discharge greywater into a surface water body (e.g., pond, stream, river, lake)*
4. Emphasize that using a grease trap and soak pit are the simplest and cheapest ways for households to manage their greywater.
5. Optional: Grease trap demonstration. Explain that greywater flows into the trap where oils, fats and soap scum float to the surface and gravity settles heavier suspended solids to the bottom. Relatively clean water then flows out of the grease trap. It is important to install a grease trap before infiltrating greywater into the ground, reusing it in agriculture, or discharging it to surface water.

Explain that we are going to watch what happens in a grease trap. Ask for a volunteer to help with the separation demonstration. Ask the volunteer, with input from the rest of the participants, to create greywater by putting dish soap, oil and food bits into a clear container filled with water. Place the greywater somewhere the participants can view it throughout the lesson.

Later in the workshop, ask the participants to look back at the greywater that was created in the demonstration. Discuss their observations. The water, oil and food bits should have separated into different layers.

6. Optional: Use PowerPoint: Domestic Wastewater to show different greywater management options.

Overflow Water Management

5 minutes

1. Ask the participants to identify ways that overflow water is currently managed in their communities.
2. Ask the participants to discuss the public health and environmental impacts when overflow water is poorly managed.
 - *Should be channeled away so that it does not cause standing water.*
 - *Overflow water that does not drain away from water points could backflow into the water source and possibly contaminate the drinking water.*
 - *Or the overflow water can cause the soil to erode away and damage the water point structure.*
3. Show the “Overflow Management” flipchart. Discuss the options for reusing and disposing overflow water in ways that are the least harmful to people and the environment:
 - *Used as irrigation water for agriculture*
 - *Infiltrated into the ground using soak pits and infiltration trenches*
 - *Released directly to surface waters (e.g., lakes, rivers or ponds)*
 - *Overflow water does not normally require treatment before it can be used, infiltrated or disposed.*
4. Optional: Use PowerPoint: Domestic Wastewater to show different overflow management options.

Review

5 minutes

1. Use Tool: A Tell B.
2. A tell B: What is blackwater and where does it come from?
3. B tell A: What is greywater and where does it come from?
4. A tell B: What is overflow water and where does it come from?
5. A tell B: What are options to manage greywater?
6. B tell A: What are options to manage overflow water?

Reflections on Lesson