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# Impact of Sullage Water on Environment

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**ABSTRACT:** Sullage water (greywater) generated from kitchens, bathrooms, and washing activities constitutes major portion of domestic wastewater. Improper disposal of this water leads to environmental degradation, groundwater contamination, and public health risks. This study evaluates the environmental impact of untreated sullage water and examines sustainable treatment using natural systems such as root zone technology and constructed wetlands. Experimental observations indicate significant reduction in Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Total Suspended Solids (TSS) after treatment. Natural treatment systems offer a low-cost, energy-efficient alternative to conventional wastewater treatment plants, particularly suitable for small communities and rural areas.

**KEYWORDS:** Sullage Water, Greywater, Environmental Impact, Constructed Wetlands, Wastewater Reuse.

## I. INTRODUCTION

Water is an essential natural resource that supports life, ecosystems, and socio-economic development. With rapid urbanization, population growth, and increased domestic water consumption, the generation of household wastewater has risen significantly. Sullage water, also known as greywater, refers to wastewater produced from household activities such as bathing, washing clothes, cleaning utensils, and kitchen use, excluding toilet waste. Although it does not contain human excreta, sullage water often carries soaps, detergents, oils, grease, food particles, nutrients, suspended solids, and microorganisms.

## II. RELATED WORK

Sullage water, also known as greywater, is wastewater generated from domestic activities such as bathing, washing clothes, and kitchen operations. It constitutes a significant portion of total household wastewater and contains various contaminants including soaps, detergents, oils, organic matter, nutrients, and microorganisms. Several studies have highlighted that the improper disposal of untreated sullage water can lead to serious environmental impacts. When discharged onto land, greywater can alter soil properties by increasing pH, salinity, and sodium concentration, which may ultimately degrade soil structure and fertility. In addition, the presence of pathogens such as bacteria and viruses in sullage water can contaminate soil and pose health risks to humans and animals.

Research has also shown that the infiltration of untreated greywater into the ground can lead to groundwater contamination. The high organic load, along with nutrients like nitrogen and phosphorus, can pollute nearby water bodies, leading to eutrophication and deterioration of water quality. Furthermore, surfactants present in detergents are considered one of the major pollutants in sullage water, as they can be toxic to aquatic organisms and may persist in the environment for a long time. These chemicals can also affect soil permeability and reduce its ability to absorb water efficiently.

Despite its negative impacts, some studies suggest that properly treated sullage water can be reused for irrigation purposes due to its nutrient content, which may promote plant growth. As a result, recent research has focused on the development of sustainable and cost-effective treatment methods such as constructed wetlands, biofiltration systems, and membrane technologies. However, there remains a significant research gap in terms of large-scale implementation, public awareness, and long-term environmental impact assessment, particularly in developing countries. Therefore, effective management and treatment of sullage water are essential to minimize its adverse environmental effects and to utilize it as a valuable resource in water-scarce regions.

### III. METHODOLOGY

#### Process of Sullage water :

##### 1 st Step : Screening process

Screening is the preliminary treatment process in a sewage treatment plant in which large floating and suspended solids are removed from in coming wastewater by passing it through metal bars or mesh screens.



#### Remove materials such as:

- Plastics.
- Rags and cloth.
- Wood pieces.
- Paper and garbage.
- Leaves and debris.
- To protect pumps, pipelines, and other treatment units from clogging or damage.
- To improve the efficiency of subsequent treatment processes. of STP plant.

##### 2 nd Step Grit Mechanism process

Grit removal is a preliminary treatment process in a sewage treatment plant in which heavy inorganic particles such as sand, gravel, silt, ash, and small stones are separated from wastewater by reducing the flow velocity so that these particles settle down by gravity.



#### Remove materials such as:

- Sand
- Gravel
- Silt
- Broken glass
- Metal particles

**3<sup>rd</sup> Step : Primary Classifier process :**

Primary clarification is the treatment process in which wastewater is held in a large settling tank (primary clarifier) to allow suspended organic solids to settle at the bottom as sludge, while lighter materials such as oil and grease float to the surface for removal



To remove settleable organic solids

- from Sewage :
- To reduce:
- Total Suspended Solids (TSS)
- Biochemical Oxygen Demand (BOD)
- To decrease the load on secondary
- (biological) treatment units.

**4<sup>th</sup> Step : Aeration process :**

Aeration is the secondary (biological) treatment process in which air or oxygen is supplied to wastewater to promote the growth of microorganisms that decompose dissolved and suspended organic matter.

**Purpose of Aeration :**

- To provide oxygen required by aerobic bacteria.
- To biologically break down organic pollutants

**5<sup>th</sup> Step : Chlorine process :**

Chlorination is the disinfection process in which chlorine or chlorine compounds are added to treated wastewater to destroy harmful microorganisms before the water is discharged into a river or reused.



- To kill disease-causing pathogens
- such as :
- Bacteria.
- Viruses.
- Protozoa.

#### **6 th Step : Clear Water Outlet :**

Clear Water Outlet is the final stage of a sewage treatment plant where treated and disinfected water is discharged from the plant after completing all treatment processes.



- To safely release treated effluent into:
- Rivers.
- Lakes.
- Drainage channels.
- Reuse systems (irrigation, landscaping, etc.).
- Soil and water quality deteriorates in affected areas
- Aquatic ecosystems are disrupted.

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#### IV. EXPERIMENTAL RESULTS

Sullage water, also known as greywater, is the wastewater generated from daily household activities such as washing utensils, bathing, laundry, and cleaning. Although it does not contain human excreta, it includes a variety of pollutants such as organic matter, oils, grease, detergents, suspended solids, and microorganisms. With the rapid growth of population and urbanization, the volume of sullage water produced has increased significantly. In many areas, especially where proper drainage and treatment facilities are lacking, this wastewater is discharged directly into the environment, leading to serious environmental concerns. One of the major impacts of sullage water is the pollution of surface water bodies such as rivers, ponds, and lakes. When untreated greywater enters these water sources, it increases the amount of organic matter present in the water. This raises the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), which indicate the level of pollution. High COD values show that more oxygen is required to break down pollutants, reducing the dissolved oxygen available for aquatic life.

#### V. CONCLUSION

Sullage water, though often considered less harmful than sewage, has a significant impact on the environment when it is discharged without proper treatment. Generated from everyday domestic activities such as washing, bathing, and cleaning, it contains organic matter, detergents, suspended solids, and nutrients that contribute to environmental pollution. When released directly into open land or water bodies, it increases pollution levels, depletes dissolved oxygen, degrades soil quality, and contaminates groundwater resources. The presence of high organic content in sullage water raises Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), indicating increased pollution and reduced oxygen availability for aquatic life. Continuous disposal also leads to accumulation of dissolved solids and chemicals in soil and groundwater, affecting their suitability for agricultural and domestic use.

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