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Greywater treatment with a multimedia filter for landscape irrigation

صورة شخصية

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Abstract:

One of the greatest the aims outlined in Saudi Vision 2030 is coordinated with water conservation through wastewater treatment. Reclamation of any wastewater is important in Saudi Arabia and other desert regions with lack of groundwater. Treated wastewater can be used for irrigation which helps reduce the usage of groundwater. Greywater, which is produced by hand washing sinks, laundries, kitchen sinks, and other sources, is extensively used everywhere. Greywater is produced in large quantities and is typically disposed directly into the sewer without being treated. The fact that treating greywater is much easier than treating wastewater could be helpful for irrigation. In our project, our aim is to design a sufficient treatment system with sustainable materials.

Introduction:

Greywater often contains significant quantities of organic materials that are readily biodegradable and some basic components that are mostly produced by households. Others include xenobiotic organic compounds and biological microbes such as faecal coliforms, salmonella, and general hydro chemical components.

Environmental Impact:

Greywater may contain a variety of chemical and physical impurities that could influence the Environment. Long-term use of greywater without effective management of the contaminant sources or the irrigation system may have further detrimental effects, including pooling and runoff. Greywater may contain substantial quantities of disease-causing organisms, particularly in situations where there are gastrointestinal illnesses among the family members. Greywater contains disease-causing organisms that are primarily spread via contact with contaminated hands, breathing in irrigation spray, and coming into contact with open wounds. Contact with contaminated objects like toys, garden tools, grass, or soil is an indirect method of transmission. In order to lessen the risk to the public's health, a number of regulations must be fulfilled, including the restriction on the use of untreated greywater to subsurface irrigation.

Materials and Methods:

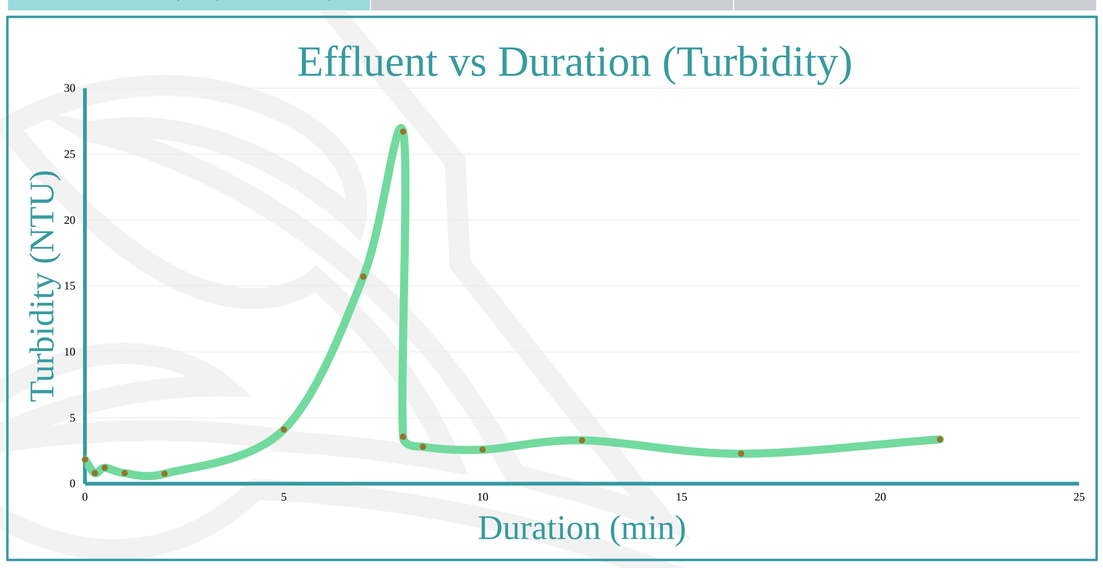
Greywater gathered from the university's restaurant will be used to conduct the study. The university restaurant is known to serve breakfast, lunch and dinner to student and the university staff members on average of 150 costumers per day. Dish washers and all types of sinks were considered to be our sources of greywater from the restaurant. In order to conduct the experiment, grey wastewater from the restaurant will be collected and transported to the Environmental Engineering Lab at KFU.

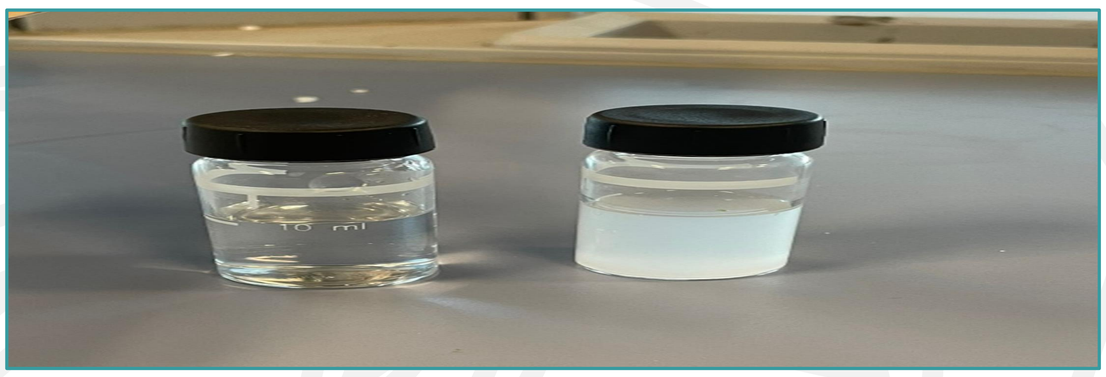
Water filtration is a technique for removing impurities from water; often, these impurities are referred to as contaminants, and water that contains contaminants is known as raw water. Raw water can be filtered by being passed through porous materials or semi-permeable membranes. Typically, pressure is required for the filtration process, however gravity can also provide it slowly.

Results and Discussion:

Our tests results show promising values, we noticed acceptable percentage removal efficiency. For an example, Turbidity had 99% removal efficiency. The cycle length was about 4 minutes before we need to perform a backwash which is also acceptable. However, we will attempt to increase it.

Parameter	Before Treatment	After Treatment
Turbidity (NTU)	556	5
pH	6.6	7.4
Electric Conductivity (µs/m)	516	273
Total Dissolved Solids (ppm)	254	134
Chloride (mg/l as Cl)	181	19





Conclusion:

By designing sufficient greywater treatment system using sustainable materials, we can eliminate environmental hazard and reduce the amount of greywater disposed into the sewage leading to expensive wastewater treatment. And using the treated greywater for irrigation is helpful to reduce the usage of groundwater. Our project satisfies the 2030 vision by our kingdom towards sustainable environment.

ملخص المشروع:

تتعدد مصادر المياه الرمادية، مثل مياه الموضوء ومياه غسيل الملابس وغسيل الصحون. في غالب الاحيان، المياه الرمادية تجمع مع مياه الصرف الصحي. معالجة المياه الرمادية تعتبر اسهل وأقل تكلفة من معالجة مياه المجاري والصرف الصحي وتتعد استخدامات المياه الرمادية المعالجة، واستخدام المياه الرمادية المعالجة في الزراعة يقلل الاعتماد على المياه الجوفية. يهدف مشروعنا الى الوصول الى نظام معالجة المياه الرمادية باعلى كفاءة ممكنة وباستخدام مواد مستدامة لتحقيق اهداف رؤية المملكة 2030 واهداف الجامعة نحو بيئة مستدامة.