Circular Economy Lab & Observatory

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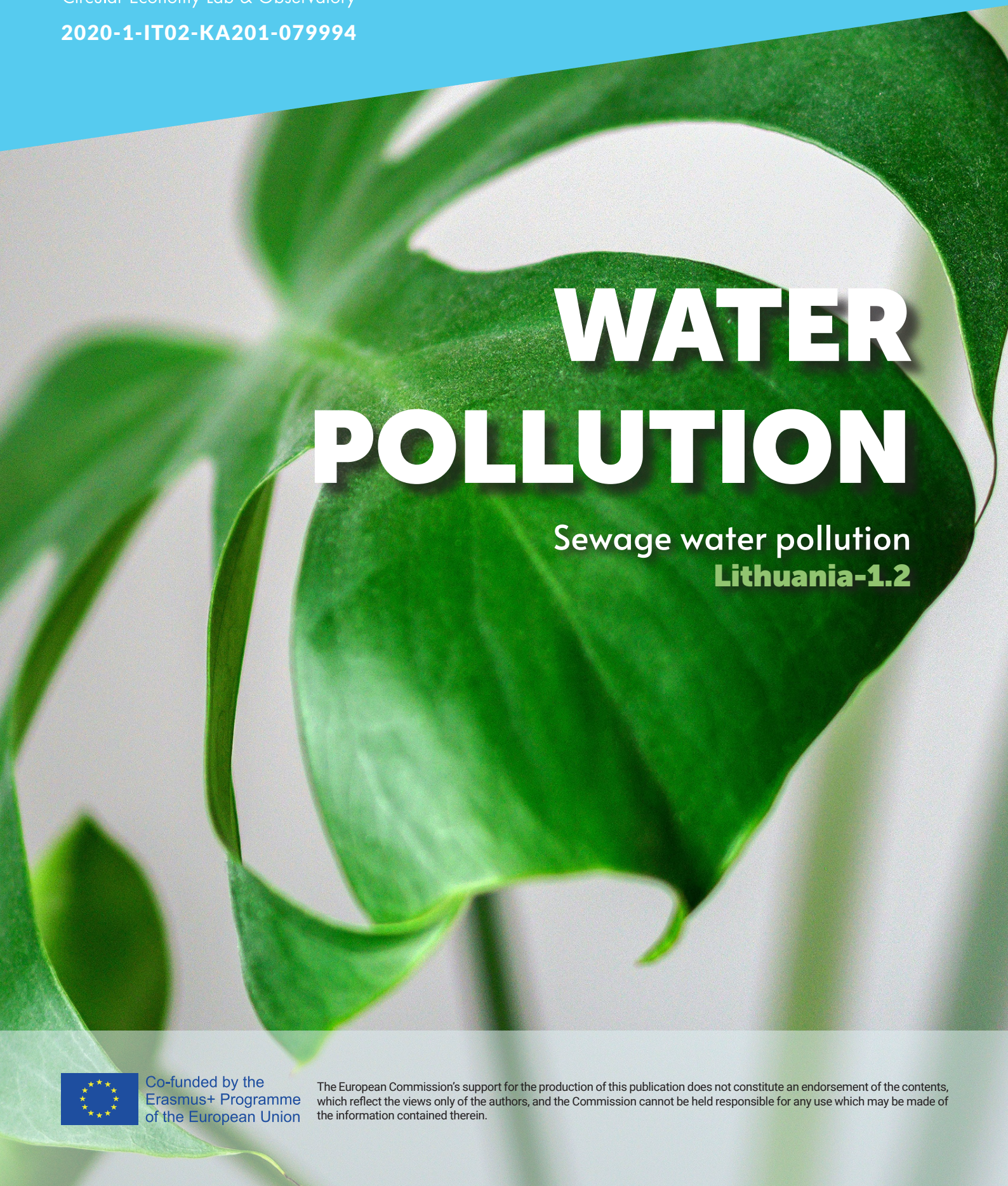

WATER POLLUTION

Sewage water pollution

Lithuania-1.2

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We acknowledge that marine managers and practitioners are probably most familiar with the term sewage in considering major impacts on reefs, however, throughout the Toolkit, we will use the term wastewater as it describes the different sources of contamination affecting reefs in an accurate way.

Photo taken by the research group

Sewage is a big modern world problem descriped as refuse liquids or waste matter usually carried off by sewers.“We view sewage treatment as one type of water use, because it is so interconnected to the other uses of water. [1]”

“Wastewater treatment plants reduce pollutants like pathogens, phosphorus, and nitrogen in sewage, and heavy metals and toxic chemicals in industrial waste, before returning treated water to the waterways.[2]”

Some industrial facilities produce wastewater similar to household wastewater, which is treated at wastewater treatment plants. Treatment plants reduce pollutants in the wastewater to levels that can be handled naturally. Sewage and industrial treatment plants are generally needed to protect water bodies from raw wastewater. Sewage treatment plants treat water from homes and businesses that contains nitrogen and phosphorus that comes from human waste, foods, and some soaps and detergents. When this polluted water is discharged into the ocean or another water body without treatment, it becomes unfit for all human and agricultural uses.

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Waste dumped on an empty lot eventually can contaminate a water supply. Land pollution can leak into a groundwater supply, then a river, and finally into the ocean.
About half of all pollution in the ocean is caused by wastewater and waste water. About 80% of global sewage is dumped – mostly untreated – back into the environment, polluting rivers, lakes, and the oceans.

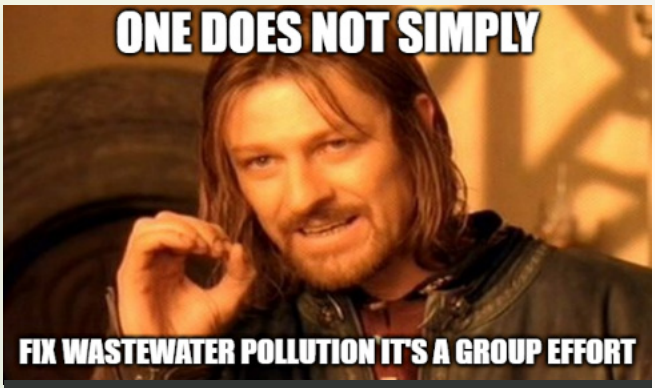

Photo by Jessica Kyle (Licensed under creative commons license)

Nature has a remarkable capacity for dealing with tiny amounts of waste water and pollution, but if we did not treat billions of gallons of waste water and wastewater produced each day before we released it back into the environment, it would be overwhelmed. "Worldwide, it is estimated that 80% of all waste – including human waste – is released back into the environment untreated, unleashing a host of harmful contaminants into the oceans and directly causing damage to humans and reefs. [3]"

When wastewater is released into the ocean and mixed with seawater, contaminants are scattered and diluted. "By far, the largest amount of waste disposed of into the ocean is wastewater.Sewage pollution readily flows into the ocean in areas lacking adequate wastewater treatment facilities, but can also be discharged readily in places that have treatment facilities, because of aged infrastructure, plant failures, and heavy rainfalls overwhelming systems and leading to combined sewer overflows. [4]" Sewage may also flow directly out of wastewater treatment plants through discharge pipes (treated or untreated), as is the case at many sewage treatment plants throughout the U.S. Coastal Region.

Pollution caused by dispersed sources is hard to control, and, although there has been a great deal of progress in the construction of modern treatment plants, dispersed sources still account for a significant proportion of the problems in water pollution.

Point sources of water pollution are easier to control than dispersed sources, since contaminated water has been collected and transported to a single point where it can be treated.

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Human activities generating household wastewater and toxic wastes contribute to water pollution by polluting water with diseasecausing microorganisms and poisonous substances. Water pollution can result from many different contaminants, including toxic waste, oil, and disease-causing microorganisms. “Water pollution occurs when harmful substances—often chemicals or microorganisms—contaminate a stream, river, lake, ocean, aquifer, or other water body, reducing water quality and making a stream toxic to humans or the environment. Water pollution is the discharge of substances into bodies of water that render the water unsafe for human use and harm aquatic ecosystems. [5]”

Another big problem causer is industrial waste, Industries and industrial sites across the world are a massive contributor to water pollution.

Many industrial sites produce waste in the form of toxic chemicals and pollutants, and though all of them are strictly regulated, some of them still do not have proper waste management systems in place.

Industrial waste from agricultural sites, mines and manufacturing plants can make its way intorivers, streams, lakes and other bodies of water that lead directly to the sea.

The toxic chemicals in the waste made by these industries not only have the possibility to make water dangerous for human consumption, they can also cause the temperature in water systems to change, making them very dangerous for lots of water dwelling organisms. Sewage pollution is an especially destructive ocean threat, due to the many types of pollutants the wastewater contains.

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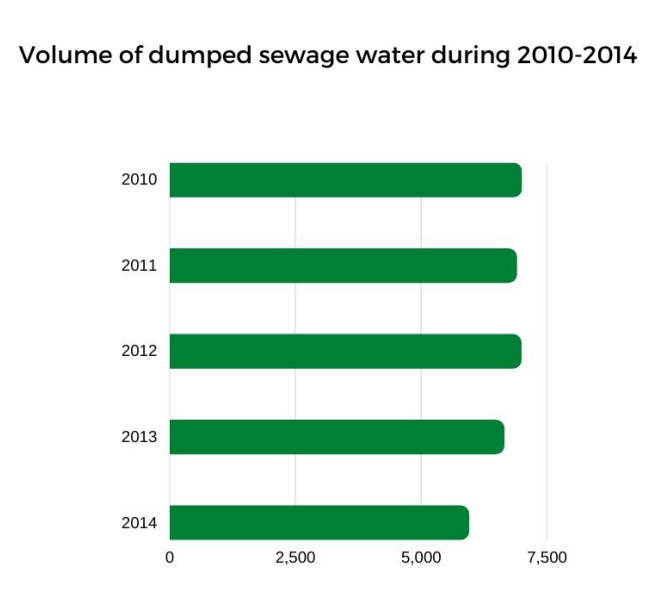

Graph made by the research group

The direct and indirect ways it pollutes freshwater, nearshore, coastal, and marine systems throughout a lagoon, its worldwide reach, its immeasurable impacts, and its relative neglect by philanthropic and development aid communities. The problem is technological and also related to infrastructure investment—as evidenced by the prevalence of inadequate and quickly aging infrastructure worldwide.

This issue is also influenced by human behavior challenges, given the relation of cultural taboos that often inhibit discussion and action.

All over the world, wastewater is flowing from pipes into rivers and seas, endangering human health and aquatic ecosystems.

"Worldwide, it is estimated that 80% of wastewater — including human waste — is dumped untreated into the environment, unleashing an array of harmful contaminants into the oceans and directly causing harm to humans and coral reefs.[6]" Other than human waste, the ocean experiences oil Leaks and spills large oil spills and oil leaks, while often not intentional, are a major cause of water pollution.

Leaks and spills often are caused by oil drilling operations in the sea or by ships that transport oil getting damaged. The use of untreated wastewater poses high risks to human health and other living organisms. All humans deserve a clean water, free from many dangerous contaminants found in wastewater.

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The only way to make sure of this is to stop overflows and spills and make sure no wastewater is released into our streams, rivers, and lakes without treatment. "Wastewater spills cause bacteria and other waste to contaminate our water sources leaving us with more work to do in the treatment area, or maybe it could be possible to stop before it happens. [8]" We must begin by looking to treat our sewage efficiently and to keep effluent from flowing into our neighbors' streams. "Until we have made substantial progress toward reducing the amount of wastewater in our waters, we need to have robust notification programs that warn people when raw sewage is in danger. [4]"

Photo by research group

Wastewater facilities must be required to alert the media, citizens, and conservation agencies when they discharge untreated wastewater into the environment.

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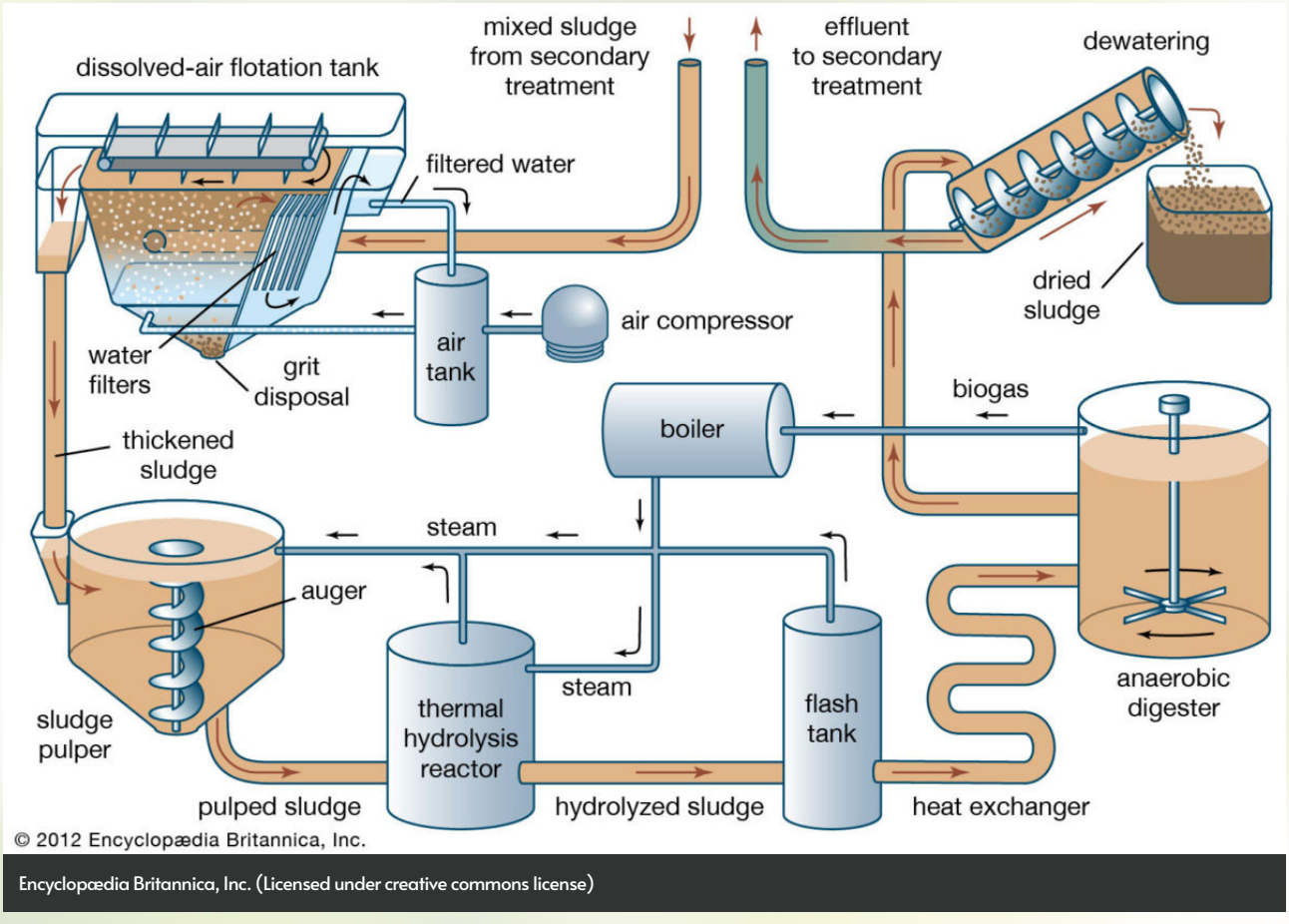
Water pollution is a problem that is increasing every year. There are many ways to reduce water pollution, but it is up to each person to do their part to make sure that the water we all rely on is clean and safe.

One way to reduce water pollution is to properly dispose of waste. This includes things like oil, chemicals, and even sewage. "If these things are not properly disposed of, they can seep into the ground and contaminate the water supply. Another way to reduce water pollution is to stop the constant use of water. This means not wasting water and using it only when necessary. [7]" This can be done by not watering the lawn as often, or taking shorter showers.



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Treating water before it enters the waterway system is one of the best ways to go around this problem. Wastewater treatment center have the technology and tools to remove most bacteria and waste in water. For example, sewage water treatments allow water to be run though different types of cleaning devices, which ensure the purity and tidiness of water. To ensure that wastewater treatments function correctly, regular maintenance of the devices is required. This includes applications like water treatment sensors, which are essential to measure and remove contaminants from water.

Another way we can fight water pollution is to take care of storm water where possible. Storm water runs along the road and other surfaces and collects viruses, bacteria, and other harmful pollutants, which then make their way into rivers, drains and eventually the ocean. We already have ways to target storm water, such as dams and storm drains, but it could have improvements. Most storm drains are outdated and let leaks and spills be left on the road, further creating more damage.

"Sewage pollution gets into our local creeks when it leaks from sewer overflows, spills or cracks in a sanitary sewer catchment. Sewage pollution also affects aquatic life, agriculture, animals and is the main cause of eutrophication and increased oxygen demand.[8]"

The uncareful treatment of wastewater leads to several problems, such as spreading diseases and eutrophication, to stop such incidents we should put more emphasis on safety precautions in facilities that handle water treatment.

We're always mentioning human safety such as non-slip surfaces, but in this scenario, we should look at the safety of the devices that clean and purify water, so no accidents causing further water waste occur in treatment facilities.

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Connections to storm drains and other advanced treatment systems are needed so we could prevent pathogens and nutrients from passing into local waterways, and reverse the damage done to human health and any other ecosystems.

It makes sure that the water discharged into local waterways, like rivers, is safe and clean, making sure that it does not cause harm to humans or aquatic life.

Sewer sludge is also a large issue that needs to be addressed as soon as humanly possible. Treatment of sewage sludge includes a combination of digestion, thickening and dewatering processes. Thickening is usually the first step in treating sludge because it is unsuitable to handle thin sludge or slurry of solids suspended in water.

Thickening is usually done in a device tank called a gravity thickener. A thickener can reduce the total volume of sludge to less than 50%. Another replacement to gravity thickening is dissolved-air flotation.

In this method, air bubbles carry the solids to the surface, where a layer of thickened sludge appears. Sludge digestion on the other hand is completely different biological process in which organic solids are festered into stable substances.

Digestion reduces the total mass of solids, eliminates pathogens, and makes it easier to dry the sludge. Digested sludge is unharmful, having the aspects and characteristics of a rich potting soil.

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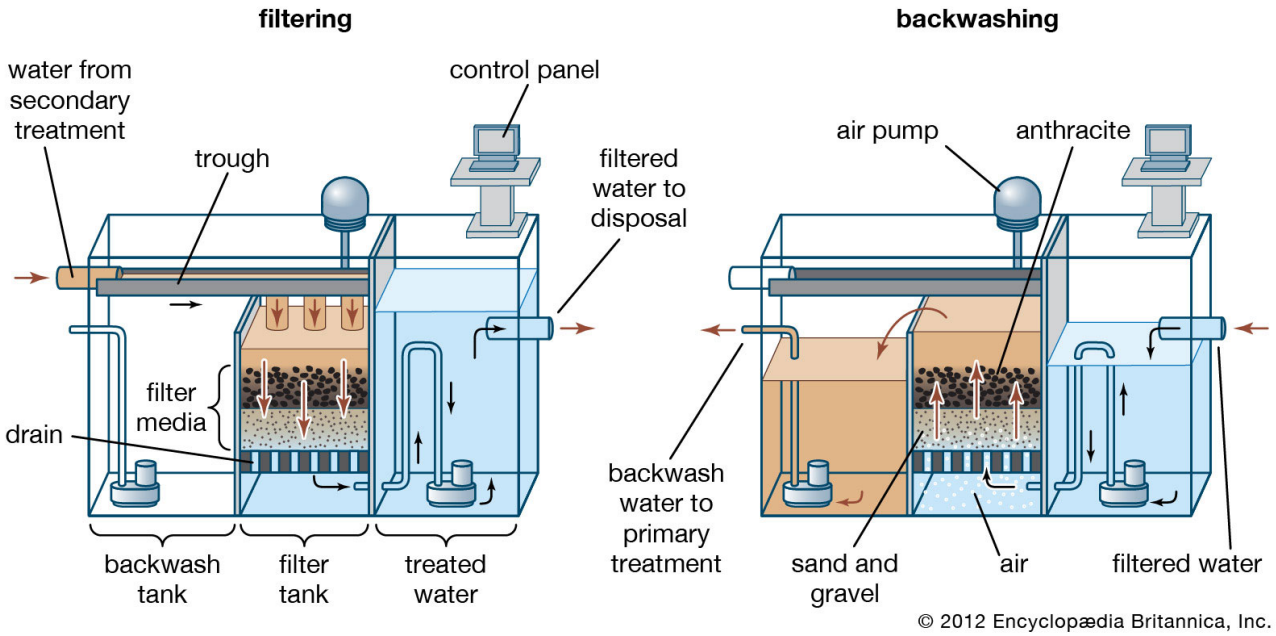
Most large sewage treatment plants use digestion system in which organics are metabolized by bacteria anaerobically (in the absence of oxygen).

Acid-forming bacteria hydrolyze large molecules such as lipids and proteins, breaking them into lesser water-soluble molecules, and then ferment those smaller molecules into various acids.

"The sludge then enters a second tank, where the dissolved matter is converted by other bacteria into biogas, a mixture of methane and carbon dioxide. Also there are way simpler things to do that can make a change. [9]" Like never pouring fat drippings (or any type of grease) down your drain or disposal, or pouring household chemicals down the drain or toilet. Do not use your toilet to throw away unrecyclable trash.

Tertiary treatment of wastewater



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Avoid flushing anything down the toilet, that is not biodegradable. Never flush old medications down the toilet. Minimize the use of pesticides, fertilizers, and herbicides and never dispose of these down a nearby sewer drain. And that is only a small number of things that could help us reduce sewage water pollution. Water pollution is best treated at its source but putting away water treatment facilities is not the way to go.

As the research has indicated, wastewater pollution is a big problem in the modern world. It causes massive damage and is extremely harmful to the environment. “Humans and animals alike suffer from wastewater pollution. It contaminates one of our most important things for survival. Most of the pollution, however, can be stopped. By doing immense testing and closing down companies that pollute the most, we can make the polluted water less proficient in our world. [7]” That, however, needs lots of funding and government action. On a smaller scale, we can also help to lessen the effects of wastewater pollution. By recycling and not throwing our trash away in the nearest waterbodies, we can definitely help to eliminate this problem which has rooted in our water way.

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Nature has a remarkable capacity for dealing with small amounts of water waste and pollution, but if we did not deal with the billions of gallons of waste and wastewater produced each day, and then released back into the environment, she would be overburdened.

https://www.nhm.ac.uk/discover/news/2021/november/the-deadly-effects-of-sewage-pollution-on-nature.html

If sewage is not treated appropriately, it could have negative impacts on the environment and human health. By treating the wastewater, the amount of waste typically released to the environment is reduced, thereby improving environmental health. Most homes and businesses send their sewage to treatment plants, which removes a lot of pollutants from the water. At specific points during the cycle, the water is treated, either naturally or through the treatment plant.

Once all of those processes are completed, fresh, cleansed and naturally enhanced water is produced. The most important goal in treating sewage is to remove as many suspended solids as possible before releasing the remaining water, called the effluent, back into the environment. Wastewater treatment plants become overwhelmed and no longer function, leading to discharge of raw wastewater, with all of its adverse consequences for humanity and the environment.

"As the overall volume of discharged municipal sewage increases, water contamination conditions across the country have grown worse. [1]"

In fact, treatment technologies for sewage have advanced to a level that it is now possible to remove practically all pollutants from the sewage.

Photo by research group

Wastewater treatment significantly hits and lowers almost all of the amount of money that a specific nation spends on the ecological remediation projects necessary to address contamination. This puts more money in to the economy, helping various fields to prosper and to do better in the future.

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GROUP

Elvijus Bartkus, Tadas Aržuolaitis,
Edvinas Nomeika, Ignas Narbutas.

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