Effect Of Covid-19 On Water And Soil Pollution

Since we are aware of the impact coronavirus has on the earth’s temperature caused indirectly by the decrease of industrial and transport activities, we will research the interconnectedness of water and climate change. As a result of this pandemic, the drop in CO2 levels, causing a proportional fall in the temperature of the earth, had various beneficial effects on water. Taking into consideration that 50% of our drinking water comes from glaciers [11], the rate at which they melt is reduced as a result of the reduction in the earth’s temperature, which in turn impacts the availability as well as the safety of our drinking water.

Not to mention the impact climate change has on rainfall, rising temperatures result in higher evaporation levels. This added evaporation will dry out certain areas and fall in others as a surplus of precipitation. Dry areas are generally predicted to get drier whereas wet areas get wetter. This would lead to increased drought occurrences in some areas as well as further flooding in others [12]. Coronavirus lockdown may have helped in minimizing the harmful effect in disguise. Fig. 8 shows the relation between temperature and average rainfall for baseline period (1961-2010) [13].

This current pandemic gave us the opportunity to curb the rise in sea levels by reducing the melting of ice caps, ice sheets and glaciers caused by global warming, thus preventing contamination of fresh water supplies. The rise in sea level will drive salt water into freshwater aquifers, rendering the water unusable for drinking or irrigation unless it is handled using an energy-intensive method. [12]

Lastly, high rainfall levels could overwhelm and damage important infrastructure such as sewage systems and water treatment plants and lead to dirty water, turning it brown or cloudy. Heavy rainfall may also contribute to increased flows of fertilizers, sediments, garbage and other contaminants into water supplies [12]. During the 2 previous months and the global lockdown enforcements all countries have been experiencing, all these adverse effects were minimized.

COVID-19 further impacts water pollution

Providing safe water, sanitation and hygienic conditions is critical to protecting people's health during all pandemics of infectious disease, including coronavirus disease 2019 (COVID-19) [14]. Some steps are being taken to prevent the virus from spreading through water, and to protect human health. Such steps reduce water pollution and enhance its quality.

Water utility managers are taking several measures to safeguard water supplies. Starting with protecting water from the source, treating water at the point of delivery, storage or consumption. In addition to successful water treatment, other steps include ensuring adequate supplies of chemical additives and consumable reagents for testing the water quality. They also ensure that essential spare parts, fuel and contractors can still be obtained, and contingency plans for personnel and training to maintain the necessary supply of safe drinking water [14]. All of these measures are aimed at reducing water contamination and providing more safe drinking water.

Studies have shown that COVID-19 is found viable in stool and urine samples collected from

patients infected with the virus in China and other countries. During the outbreak, an appropriate disinfection procedure was implemented to ensure the virus did not spread by recycled effluent. Chlorine (as gaseous chlorine or sodium hypochlorite), ultraviolet (UV) irradiation, and ozonation are the most widely used wastewater disinfection methods [15].

As shown in Figure 9, various disinfection methods are combined, and control mechanisms are used to provide several barriers to promote and ensure the safety and quality of water. The advantages of each disinfection technology and the synergy between the various technologies can be realized in full. Recent findings showed that ozonation results in an increase of 20-30 per cent of the water's UV transmittance, thereby reducing the UV dose. During the COVID-19 outbreak, the dosage of ozone and UV was modified to achieve a high degree of disinfection, while the residual chlorine concentration remained fairly constant, leading to lower water contamination. [15]

Effect of COVID-19 on soil pollution

Definition of soil pollution

It occurs when contaminants mix into the soil, reducing its quality and rendering it uninhabitable for microorganisms that naturally live in and enrich the soil to make it more suitable for healthy plant growth.

Soil contamination can either be done by humans or by natural processes. This is largely attributed to human actions, though. Soil pollution may take place due to surplus amounts of chemical compounds, including pesticides, herbicides, ammonia, hydrocarbon fuels, plum, nitrate, mercury, naphthalene, etc.[21]

It is necessary to remember that all soils contain poisonous and dangerous substances for humans and other living species. Nevertheless, these pollutants are relatively small in unpolluted soil to pose no danger to the habitats. The soil is considered to be contaminated if one or more of these poisonous compounds have a high degree of concentration enough to kill live organisms.

Table1 shows soil pollution sources

The root cause of soil pollution is often one of the following:

1. Agriculture (excessive/improper use of pesticides)
2. Excessive industrial activity
3. Poor management or inefficient disposal of waste

The problems of soil regeneration (soil decontamination) are closely linked to soil degradation. The greater the pollution, the more remediation resources are required.[22]

Causes of soil pollution

Natural Pollution of Soil:

Some pollutants are naturally accumulated in soils at some extremely rare processes. This may occur because of the atmospheric differential deposition of soil. Another way this type of soil pollution can occur is through the transport of soil pollutants with water from precipitation.

An example of natural soil pollution is the accumulation in some dry, arid ecosystems of compounds containing the perchlorate anion (ClO_4^-). It is vital to know that such toxins can be produced naturally in the soil under certain environmental conditions. For instance, in soils containing chlorine and certain metals, perchlorates may be formed during a thunder surge.

Anthropogenic Soil Pollution:

Nearly all the soil pollution cases are anthropogenic in nature. Soil contamination can result from a variety of human activities. Some of those processes are outlined below:

- Asbestos pollution of surrounding land can be caused by the destruction of old buildings.
- The use of lead-based paint during construction activities may also contaminate the soil with hazardous levels of lead.
- Disposal of petroleum and diesel during transport may contaminate soils with petroleum hydrocarbons.
- Metal-casting factories(foundry-related activities often cause metal contaminants to be dispersed into nearby soils.
- Underground mining activities can cause heavy metal contamination of the land.
- Improper disposal of highly toxic chemical / industrial waste can seriously pollute soil. For example, storing toxic waste in landfills can result in the waste filtering into the soil. This waste can also continue to pollute groundwater.
- Many hazardous substances contain chemical pesticides. The overuse and inefficiency of chemical pesticides can lead to severe soil pollution.
- Sewage produced in urbanized areas may also contaminate soil (unless properly disposed of). These wastes can also contain several carcinogens.[22]

Carbon waste, electronic waste and coal ash are other pollution sources that can pollute soil. Soil contamination may be either natural or human. However, this is mostly due to human activities that cause most soil pollution in agriculture, such as heavy industries or pesticides. [22]

Pesticides

Prior to World War II the chemical nicotine present in tobacco plants was used in agricultural practices as the pest controlling substance. However, during World War II, DDT was found to be extremely useful for malaria control and as pest control. Hence, it was used to control many diseases.

Therefore, people in the post-war period began using it for the purpose of killing rodents, weeds, insects, etc. and avoiding the damage caused by these pests. Nevertheless, in other parts of the world like India, the adverse consequences of these drugs slowly contributed to their ban.

In addition, pests became resistant to DDT due to the regular use of chemicals. This, therefore, led to the introduction of other harmful chemicals like Aldrin and Dieldrin. Pesticides are organic

poisonous chemicals that certainly destroy various species of pests, but they have other ecological implications. they do not affect agriculture.

They are usually water-insoluble, and non-biodegradable. These chemicals will therefore not gradually decompose and will continue to accumulate in the soil. Consequently, if these chemicals are moved via the food chain from the lower to the higher Trophy level, their concentrations would increase. Accordingly, many human metabolic and physiological disorders are the bi-products of such chemicals.

Chlorinated Organic toxins

DDT and other chemicals have a negative effect , leading to less natural persistence and more biodegradable compounds such as carbamates and organophosphates. These chemicals however act as harmful nerve toxins, making them more dangerous to humans. It has led to pesticides in some agricultural fields being related to the death of field workers.

Herbicides

Little by little, the industries started producing herbicides such as sodium arsenite ($Na3AsO3$), sodium chlorate ($NaClO3$), etc. Herbicides can decompose in a few months ' time. However, they still have an impact on the environment and are not environmentally friendly. Though not as harmful as organo-chlorides, most herbicides are toxic. Birth defects are known to be caused by herbicides.

In addition, research suggests that spraying herbicides, in comparison to manual weeding, causes more insect attacks and plant diseases. One thing to note here is that all the factors mentioned above occupy only a small portion of the causes. Most of the causes are related to producing activities in chemical and industrial processes released in nature or the environment.

Inorganic Fertilizers

Overuse of inorganic nitrogen fertilizers leads to soil acidification and contamination of agricultural soil. Also known as Pollution Agrochemical.

Industrial Pollution

The incorrect way of disposing of chemical waste from various kinds of industries can cause soil contamination. Negative effects such as the change of the soil’s natural pH levels and soil pollution is caused by the burning of hazardous waste, heavy metals, harmful substances, oil and petrol dumps etc.

Inferior Irrigation Practices

Poor irrigation methods increase salinity in the soil. In addition , excess watering, unsuitable maintenance of canals and irrigation channels, lack of crop rotation and intensive farming gradually decreases soil quality over time and causes land degradation.

Solid Waste

Plastic disposal, cans, and other solid waste fall into the soil pollution category. Disposal of electrical goods such as batteries causes the presence of harmful chemicals and an adverse effect on the soil. Lithium present in batteries, for example, can cause soil to leach.

Urban Activities

Lack of proper waste disposal, due to lack of proper drainage and surface run-off, regular construction can cause excessive damage to the soil. This human-disposed waste contains chemical waste coming from residential areas. In addition, leaking of sewerage systems can also affect soil quality and cause soil pollution by altering the soil's chemical composition. [21]

COVID-19 and soil pollution:-

The quarantine policies, established in most countries, due to covid-19 have affected soil pollution causes negatively and positively. However, a severe reduction in the past causes of soil pollution has been noticed. Moreover, there are some further direct effects like:

1. Clean beaches

Beaches are among the largest natural assets found in coastal areas [21]. They provide services (land, sand, recreation, and tourism) that are critical to coastal communities' survival and have inherent values that need to be protected from over-exploitation. Irresponsible use by humans, however, has caused many beaches around the world to present pollution problems.

The shortage of tourists causes a drastic change in the presence of many beaches worldwide due to the social distancing steps triggered by the latest coronavirus pandemic. Beaches such as Acapulco (Mexico), Barcelona (Spain), and Salinas (Ecuador) today feel better with crystal clear seas, for example.

2. Increased waste

The production of organic and inorganic residues is accompanied indirectly by a wide range of environmental issues such as sole erosion.

The quarantine policies, set in most countries, have led consumers to increase their demand for home delivery online shopping. Consequently, household-generated organic waste has increased. Food purchased online is also shipped packaged, so inorganic waste has increased as well.

Medical waste is on the rise too. During the outbreak, hospitals in Wuhan generated an average of 240 metric tons of medical waste per day compared to their previous average of less than 50 tons. In other countries like the US, garbage from personal protective equipment, such as masks and gloves, has increased. [23]

Conclusion

Now that we have studied the effect of the coronavirus pandemic we’re experiencing globally nowadays, it has become clear that humans hold a great harmful impact on the environment, in

fact humans are the main influencers on the environment and its elements. Our environment is healing when we are in less contact with it, and while minimizing our harmful actions. This sheds a light on the fact that we, humans, are definitely capable of reviving Mother Nature and improving life on Earth for years to come. Not only did the pandemic show us how much humans had negatively impacted their environment, but also how much their absence can heal the planet in ways we did not expect and need to maintain & develop. What the virus outbreak really did is make humans scared, hence less human activity and exposure to the environment. Less human activity meant drastic improvements in the environments most essential elements: air, water & soil. To conclude we would like to state how all aspects of the environment were improving. As for Air pollution, air contamination has seen an unprecedented decrease mainly due to the decrease in transportation in all its means which meant less harmful gases emitted in the atmosphere, giving the ozone layer a chance to heal. When it comes to Water Pollution, we know that less human activity meant less cargo ships needed to transport goods also decreasing CO2 emissions. Since we are aware of the impact coronavirus has on the earth's temperature caused indirectly by the decrease of industrial and transport activities, leading to a decrease in the rate at which polar ice caps melted.

Last but not least, soil pollution was also affected by the absence of human activity as beaches got cleaner with fewer humans outdoors, however, some bad effects followed the soil element as the medical wastes increased during this pandemic. All stated above were effects of 'COVID-19' on our planet's environment, mostly much-needed improvements that gave our planet the breath it needed. Hopefully, these improvements continue in this beneficial way even after all of this is over.