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The Face Mask Pollution

Ecosystem Restoration

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The Face Mask Pollution and Ways to minimize it

Captain Arif Mahmud

The illness due to COVID-19 altogether influences not just human wellbeing, it additionally influences the abundance of world economy and regular daily schedule of human existence. To control the spread of the infection, face mask is utilized as essential individual defensive or Personal Protective Equipment (PPE). Hence, the creation and utilization of face covers essentially during the period of COVID-19 pandemic is actually beneficial as per the opinion of the health professionals. Most of the disposable categories of face masks contain plastics or different subsidi-

aries of plastics. Accordingly, this broad use of face masks creates million tons of plastic waste.

A Hong Kong based environmental group 'Ocean Asia' in their report about " The impact of COVID -19 on marine plastic pollution" has proclaimed that an estimated amount of 1.56 billion masks have entered the oceans in 2020, which amounts between 4,680 and 6,240 metric tons of plastic pollution. These masks will take as long as 450 years to break down and all the while serve as a source of micro plastic and negatively impact marine wildlife and ecosystems. 'Ocean Asia' also estimates that, from a global production of approximately 52 billion masks made in 2020, at least 3 per cent will enter the seas. The use of PPE, in particular face masks, and to a lesser extent gloves and face shields, has become widespread and a common tool used in preventing the spread of the pandemic. The value of the global face masks market was $0.79 billion in 2019, but expanded to an estimated $166 billion by the end of 2020 as per the estimation of 'Ocean Asia'.

The pandemic triggered an estimated global use of 129 billion face masks according to estimates in a 2020 study published in Environmental Science and Technology, a peer-reviewed scientific journal by the American Chemical Society. Experts estimate that 30 percent more waste would be produced in 2020 and in 2021 compared to 2019. The study states that this increase is in part due to the "increased the use of PPE by the general public" during the pandemic, and thus getting thrown out as municipal solid waste, or everyday trash or garbage. Unfortunately, not everyone disposes of single-use face masks property. It is seen in offices, gardens and streets masks has been discarded and forgotten and, if the masks are thrown away in an outdoor garbage container without a lid, they can fall out or be blown away by the wind.

Types of Face Masks:

During this COVID-19 pandemic, as advised by WHO and doctors most of the people are using Face Masks. There are various types of face masks available in the market. Some of the masks are very expensive but normally the face masks are not very expensive and even the poor people are also using various types of face masks. It would not be appropriate to discuss about the efficiency of masks rather I shall discuss about the environmental hazards that may arise from these masks. Roughly the face masks are of three types and they are:

Disposable Type Surgical Face Masks :

A surgical mask, also known as a medical face mask, is a personal protective equipment worn by health professionals during medical procedures. It prevents airborne transmission of infections between patients and/or treating personnel by blocking the transmission of pathogens (primarily bacteria and viruses) shed in respiratory droplets and aerosols into and from the wearer's mouth and nose.

These masks are three-ply (three layers). This three-ply material is made from melt-blown polymer, most commonly polypropylene, placed between non-woven fabrics. The melt-blown material acts as the filter that stops microbes from

entering or exiting the mask. Pleats or folds are commonly used to allow the user to expand the mask such that it covers the area from the nose to the chin. The masks are secured to the face with ear loops, head ties, or elastic straps.

Disposable Type N95 or KN 95 face masks

The N 95 face masks are quite efficient but they are generally expensive. Similar type of face masks are made in China and are called KN 95 and the KN 95 face masks are cheaper than the original N95. But as a whole both N 95 and the KN 95 are expensive than other face masks. The N 95 and the KN 95 are disposable, but they can be washed and reused in extreme emergency. The N 95 and KN 95 consists of multiple layers of nonwoven fabric, often made from polypropylene. The two outward protective layers of fabric, covering the inside and outside of the mask, are created using spun bonding. These masks are made from synthetic plastic fibers, usually polypropylene (PP). They also contain rubber and metal for the straps, staples, and nose bar.

Reusable & Washable Cloth Face Masks:

There are numerous types of face masks available in the market and they are of purely fabric origin. These masks are of various shapes, types and designs. Most of these

types of face masks are very cheap but there are some branded face masks that are very expensive. These fabric made face masks are washable and reusable. These masks are free from plastic and polypropylene, naturally biodegradable and do not pose any threat for the environment.

Threat to the Environment:

The disposable or single use face masks are made from a variety of melt blown plastics and are difficult to recycle due to both composition and risk of contamination and infection. These masks enter rivers and oceans when they are littered or otherwise improperly discarded, when waste management systems are inadequate or non-existent, or

A Penguin died due to ingestion of face mask

Seagull found entangled with disposable face mask.

A bird fouled by face mask

when these systems become overwhelmed due to increased volumes of waste.

The 'Ocean Asia' report states that plastic in the marine environment can have a devastating impact on wildlife and ecosystems. Face masks in the marine environment serve as a source of micro-plastic and could take around 450 years to fully decompose. It says though studies examining the decomposition of face masks are limited, a recent study of plastic pollution in the Magdalena River, Columbia, found that "the degradation of nonwoven synthetic textiles was the predominant origin of micro-plastic micro-fibers found in both water and sediment samples.

The design of face masks, and particularly ear loops, makes them possible entanglement risk for wildlife. In July, the Royal Society for the Prevention of Cruelty to Animals (RSPCA) in the UK reported encountering a Sea gull with its feet tangled in the straps of a face mask. Similarly, a group of volunteers conducting a beach cleanup in Miami, USA, found "a dead fish tangled in the ear loops of a disposable blue facemask. A Brazilian marine conservation organization, also reported finding a penguin with a mask in its stomach on a sea beach in Sao Paulo.

Masks & Gloves found in water

Disposable face masks are threat to aquatic animals, plants and coral.

The disposable or single use face masks are made from a variety of melt blown plastics and are difficult to recycle due to both composition and risk of contamination and infection. The design of face masks, and particularly ear loops, makes them possible entanglement risk for wildlife.

Prevention of Pollution by the disposable Face Masks:

The COVID 19 pandemic may last for some more years and if we continue to discard the plastic based and plastic coated disposable masks without taking proper care, may be after few years we shall find that COVID 19 is under control but the damage to the environment by the disposable face masks has gone beyond control.

As we know the disposable face masks are made with plastic or polypropylene fibers and these are as harmful as the normal plastics and they do not decompose easily. Most of the plastic items take hundreds of years to decompose and within that period it will create various problems for the environment and animals. If discarded in land or in a drainage system, it will obstruct the water flow and if discarded in water it may create various problems aquatic animals and birds.

Actions to be taken to reduce the Pollution from disposable Face Masks:

The wearing of face coverings or masks is likely to continue for few years more and we must think

about how we can keep ourselves and others safe and continue to reduce the use of plastic. We should take the following actions:

- The surgical and the disposable face masks are normally used by doctors and the medical staff and they should make sure to dispose them properly like the medical waste in sealed containers in proper manner.
- When the disposable face masks are used by normal people, they must make sure that all the face masks are disposed properly in sealed containers and separated from other garbage.
- The Government and the municipal authorities should organize awareness campaigns to educate citizens about the dangers of the disposable face masks and ways to dispose all the masks properly.
- The authorities should encourage the mass to use washable and reusable cloth face masks for protection against COVID 19.
- We should use reusable masks without disposable filters and wash them regularly.
- If possible, we should carry a spare mask with us, so if something goes wrong with the one in use and we do not need to use or buy a disposable mask.
- If we need to use a disposable mask, we should discard it at home and put it into a bin with a lid. If this isn't possible then we should place it in a proper public garbage bin marked for plastic collection.
- We should not flush disposable masks down the toilet.
- We can make our own fabric masks and give them to our parents and children.
- We can set up disposable mask-only trash containers in hospitals, schools and in other public places for collection and disposal of the disposable face masks.

Recycling of the Disposable Face Masks

A French company named 'PLAXTIL' which has been collecting disposable face masks from June 2019 and they have come up with a way to recycle the old disposable face masks and turn them into a raw material to produce various plastic products. This organization has already recycled 70,000 face masks with the help of collection points set up in local supermarkets.

The collected old and used face masks first have to be quarantined for four days. Afterwards, the disposable masks are shredded into pieces and treated with UV light and the masks are made germ free. Those small mask fragments are then shredded down even further and mixed with a binding agent to produce raw materials. The newly obtained raw material is currently being used to produce plastic visors, but it can also be used to make other plastic products.

Recycling of the single use disposable face masks and use them to produce other plastic products is a brilliant innovation. The government or the private sector enterprises of our country make initiate such an endeavor to save the people from the very contiguous COVID 19 germs and also save the environment from the dangers of the plastic pollution.

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Brick kilns are an Awful Environmental killer

Esteak Ahammed Emon

Bangladesh is the 2nd largest brick producer in South Asia, followed by India. According to the world bank, there have more than 7000 brick kilns operating in Bangladesh, producing an estimated 27 billion bricks annually that contribute 1% to the national GDP and employ nearly 1 million people. Rapid urbanization, industrialization and construction of buildings in Bangladesh use bricks from several past decades. Due to the unavailability of stone aggregate, brick is the main building material for the country's construction industry. This has reinforced brick manufacturing industry a fastest growing sector in Bangladesh due to increasing demands and availability of raw materials such as mud soil or clay, fuel materials and

cheap labour.

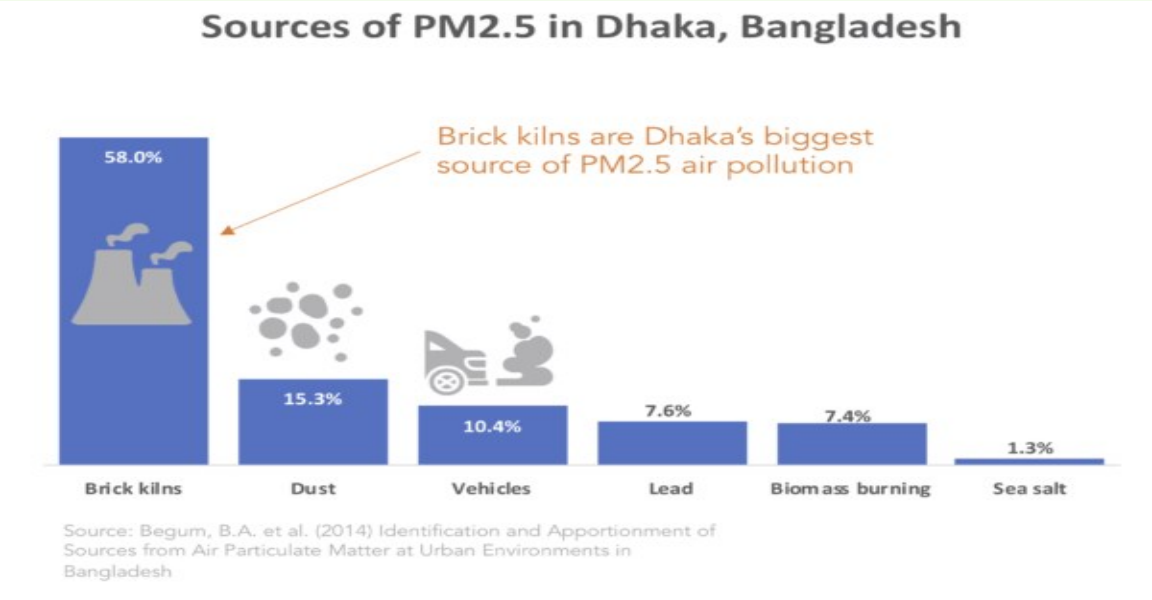
There are generally six types of brick kilns in Bangladesh: (i) bull's trench kilns (BTKs), (ii) fixed chimney kilns (FCKs), (iii) improved zigzag kilns, (iv) vertical shaft brick kiln (VSBKs), (v) Hoffman kilns, and (vi) tunnel kilns. Prior to 2004, most of the kilns in Bangladesh were BTKs, a relatively primitive design developed over 150 years ago. BTKs are highly polluting and energy inefficient. After the promulgation of the brick burning rules in 2002, most BTKs were converted to FCKs, which are more energy efficient while fine particulate emissions remain the same. The brick sector satisfactorily complied with the government's directive in 2002 to construct chimneys at the designated 120–130 feet (36.6–39.6 meters) height.

Brick kilns in Bangladesh are mostly informal and small-scale operations. More than 90 percent of brick kiln owners are small-scale operators. Most FCKs are individually owned, with each owner possessing one kiln only. Multiple ownership of one kiln and multiple kilns under the same ownership are rare. In a few cases, established business houses own brick kilns that are part of a portfolio of industrial establishments. The kiln owners are organized as the Bangladesh Brick Manufacturers Owners Association (BBMOA). This association is expected to support actions perceived as beneficial to the interest of its members; thus, it must be involved in any reform concerning the brick sector.

Brick kilns have a negative effect on agricultural productivity. Agricultural soil is the major raw material for brickmaking industry in Bangladesh. They use the upper layer of the soil, which is known as top soil. Depletion of topsoil with high organic content for brick-making is a major concern for agricultural production. Top soil is the most important part of soil for agricultural purpose. Topsoil is the upper, outermost layer of soil, usually the top 5–10 inches (13–25 cm). It has the highest concentration of organic matter and microorganisms and is where most of the Earth's biological soil activity occurs. Topsoil is composed of mineral particles, organic matter, water, and air.

Brick kilns, involving the burning of low-grade coal, are one of the major sectors that contribute to air pollution in South Asia. The brick sector is responsible for up to 91% of total Particulate Matter (PM) emissions in some South Asian cities. In Bangladesh, the contribution of the brick sector to

the total annual CO2 emissions of the country (17%) is far more significant than its GDP contribution (1%). Brick kilns are also estimated to emit 22 and 37 kt/year of PM2.5 and PM10 respectively. The airborne particulates and associated trace metals have been associated with both acute and chronic adverse health effects, mainly respiratory disease, lung cancer, heart disease, and damage to other organs. Various gaseous and particulate pollutants from brick kilns show negative impacts on the adjacent vegetation and have direct and indirect effects on agriculture.



Brick kilns are major sources of greenhouse gas in Bangladesh, emitting annually 6 to 9 million tons of CO2. Such high levels of emissions are a result of the use of age-old technologies and substandard fuels such as high Sulphur coal, tires and wood used in the kilns. The brick kiln laborer's, after brick burning, open the air pockets of the burner to cool it down, which emits hot air and ashes that spread over to the nearby paddy fields, during brick production.

According to the Food and Agriculture Organization, the amount of total agricultural land in Bangladesh is decreasing day by day for large population. Now a days, for those outdated brick kilns have becomes another awful anxiety for it. Brick kilns are polluting both air and soil, which is an appalling matter for the cultivation. Besides the Brick kilns the productivity of soil being damaged, biodiversity is being harmed, this leads to harmful impacts on health. For uses top soil land area becomes low, there can be appear water logging. Now at the time the use of environment friendly brick kilns can be the best solution of this acrid problem. As of late, government should take apt initiative about brick kilns for welfare of the environment as well as the country.

More than 90 percent of the country's brick kilns use 150 years old energy intensive and highly polluting technology. The new Hybrid Hoffman technology has the potential to save energy and resources and help build a cleaner Bangladesh. The Hybrid Hoffman Kiln's success is its ability to completely burn most of the fuel that is mixed into the bricks during firing, and thereby drastically reduce energy use and production costs. It also dries the bricks by directing hot air into the tunnel from the annular kiln, which blocks greenhouse gas emission. So, government should setup this bricks technique to arrive on prosperous Bangladesh.

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Ecosystem Restoration And PPE Pollution in COVID-19 Pandemic

Md. Nakibul Hasan Khan

ANIMALS AT RISK Seagulls pick up a discarded face mask in Dover, England, in August 2020. Source: LEON NEAL—GETTY IMAGES

Convention on Biological Diversity (CBD, 1992) defines an "'**ecosystem**' as a dynamic complex of plant, animal and micro-organism

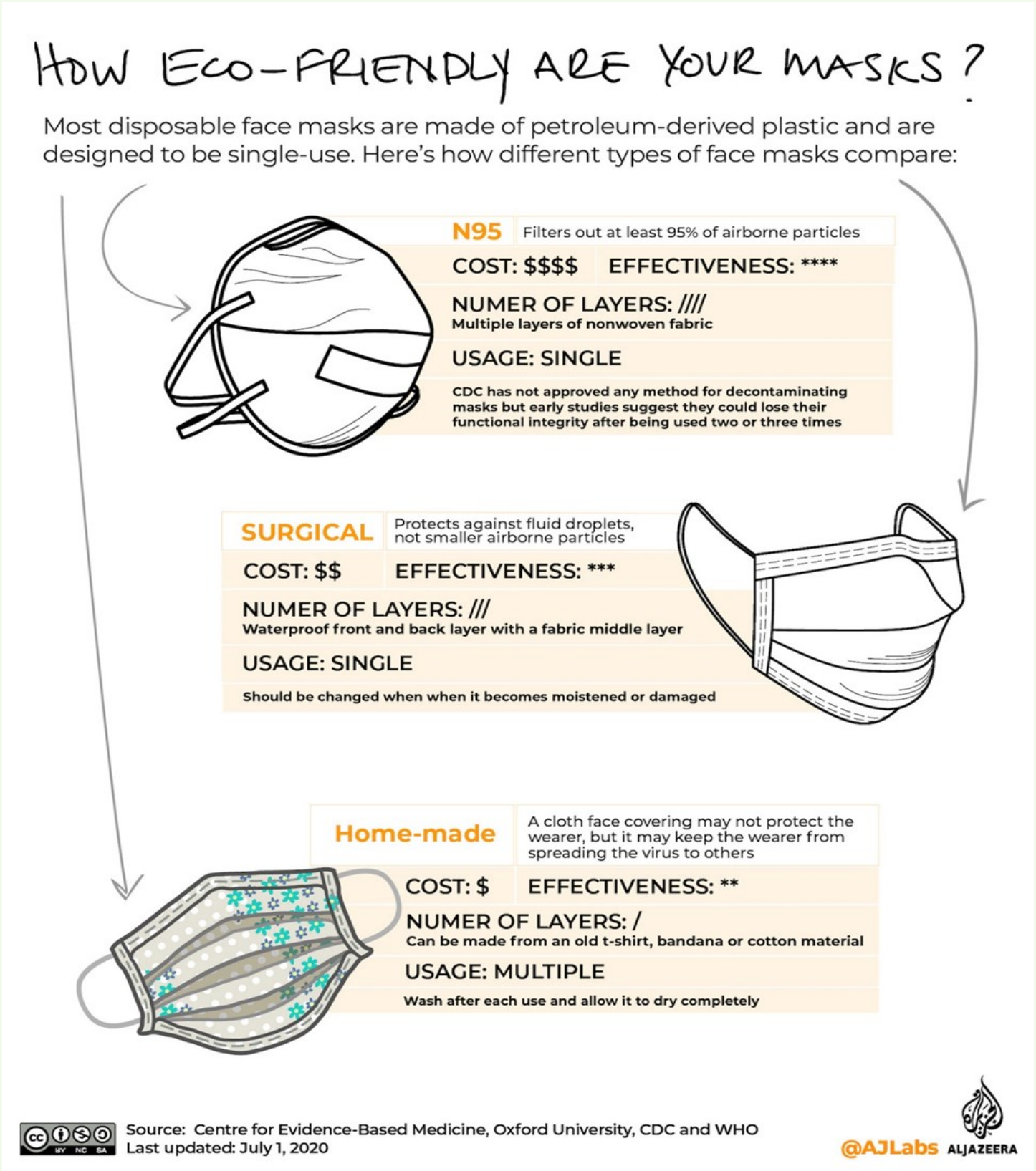
communities and their non-living environment interacting as a functional unit" (CBD, 1992). The term "ecosystem" can refer to any functioning unit at any scale which is determined by the problem being addressed (CBD, 1992). The main type of ecosystem includes: Farmlands; Forests; Freshwater: Lakes and rivers; Grasslands, Shrublands and savannahs; Mountains; Oceans and coasts; Peatlands; Urban areas.

Restoration is defined by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2018) as "any intentional activity that initiates or accelerates the recovery of an ecosystem from a degraded state, whatever is the form or intensity of degradation. Restoration responses are diverse depending on the type of ecosystem in which they are to be applied (croplands, forests, rangeland, urban land, wetlands, etc.).

Discarded ppe medical face masks & latex glove pollution on a beach/ peter jozefek, Canva

Ecosystem restoration is defined as "a process of reversing the degradation of ecosystems, such as landscapes, lakes and oceans to regain their ecological functionality; in other words, to improve the productivity and capacity of ecosystems to meet the needs of society. This can be done by allowing the natural regeneration of overexploited ecosystems or by planting trees and other plants (UNEP, 2019)."

The objective of ecosystem restoration is to contribute to the conservation and sustainable use of biodiversity as well as create social, economic, and environmental benefits, whereby healthy and connected ecosystems should contribute to improve food and water security, people's livelihoods and to mitigate and adapt to climate change" (CBD, 2019). Considering ecosystems as socio-ecological areas which deliver multiple functions that benefit a diversity of stakeholders can help to identify the drivers of ecosystem degradation and loss, the existing interests to manage the landscape, economic issues and long-term goals for the ecosystem (IUCN, 2008).
All types of ecosystems are restoring naturally



during this COVID-19 pandemic due to worldwide lockdown, movement restriction of people, reduction of fossil fuel burning etc. Different studies indicate that the COVID-19 pandemic situation significantly improves air quality in different cities across the world, reduces GHGs emission, lessens water pollution and noise, and reduces the pressure on tourist destinations, which may assist with the restoration of the ecological system. In addition, there are also some negative

consequences of COVID-19, such as an increase of medical waste, careless use and disposal of disinfectants, mask, and gloves; and the burden of untreated wastes continuously endangering the environment.

The global coronavirus pandemic has created a new and completely unprecedented problem – the littering of personal protective equipment (PPE). People everywhere are wearing PPE to protect themselves from COVID-19. But when PPE is not disposed of properly, it pollutes the environment and endangers wildlife. Environmentalists and others are concerned about this growing problem.

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, safety helmets, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits eye protection, high-visibility clothing, safety footwear and safety harnesses.

"The global coronavirus pandemic has created a new and completely unprecedented problem – the littering of personal protective equipment (PPE). People everywhere are wearing PPE to protect themselves from COVID-19. But when PPE is not disposed of properly, it pollutes the environment and endangers wildlife. Environmentalists and others are concerned about this growing problem"

Whilst we completely support the need for PPE to keep us safe during these testing times, we are concerned about how these single-use masks and gloves are being disposed of – and what this means for our planet. Between the end of February and mid-April this year more than a billion items of personal protective equipment were given out in the UK alone. In a hospital environment, these items are regarded as medical waste, but we're seeing them littering our streets and washing up on beaches across the world. This litter represents not just a threat to the health of the people who encounter it and clean it up, but also to the environment as a whole.

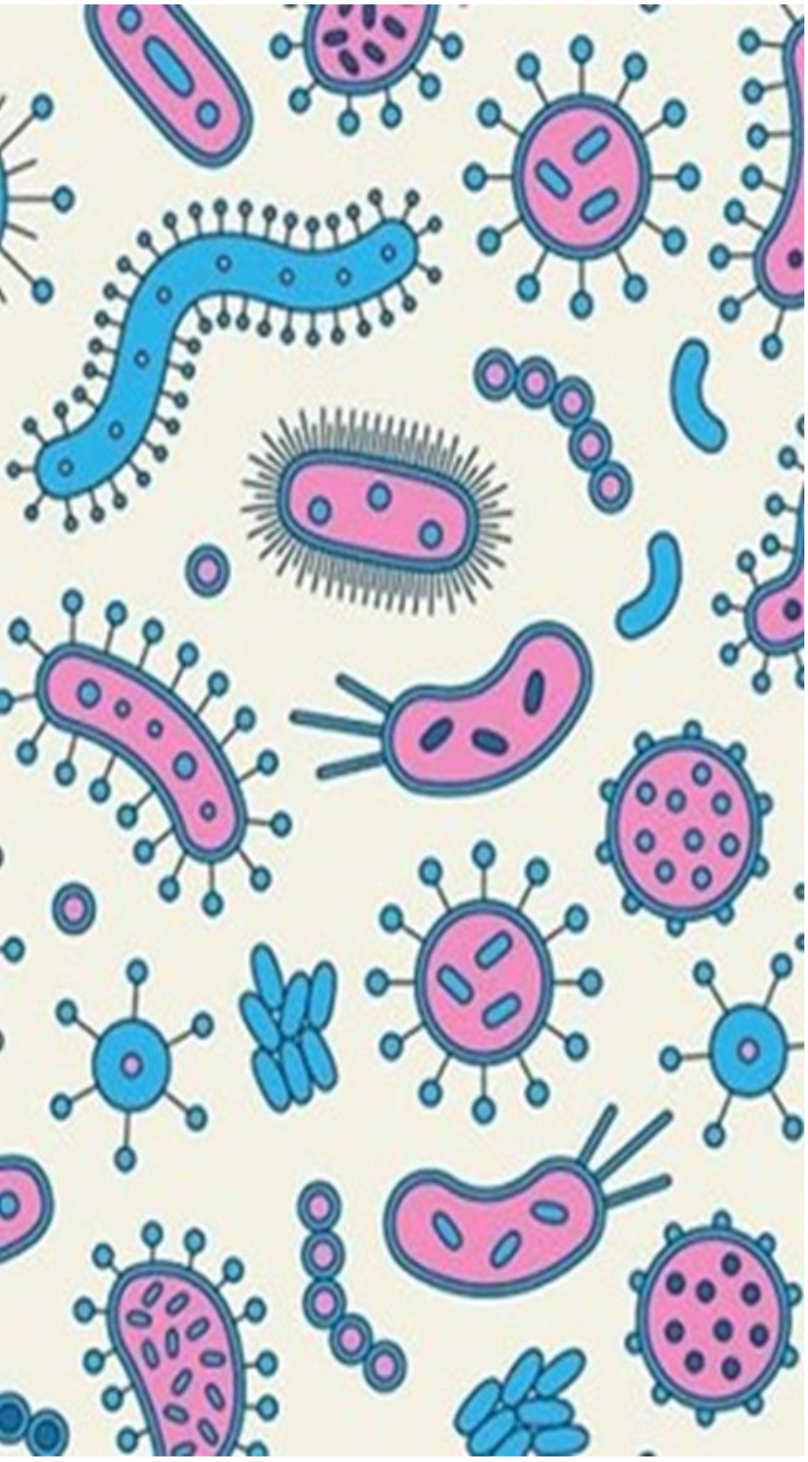
Each year, at least 8 million tons of plastic enter the world's oceans, according to the International Union for Conservation of Nature. Now, this waste includes more PPEs. Experts estimate that up to 129 billion face masks and 65 billion gloves are used each month. PPE waste is a significant threat to oceans and marine life. PPE waste threatens other wildlife too. We've already seen beaches covered in masks across Asia and heard reports of birds entangled in them. The 'Ocean Asia' report states that plastic in the marine environment can have a devastating impact on wildlife and ecosystems. Face masks in the marine environment serve as a source of micro-plastic and could take around 450 years to fully decompose.

PPE will continue to be common until the pandemic ends. But there are steps we can take to reduce its environmental impact. Wear clean reusable masks. If we are using a disposable one, snipping the straps before throwing it out. This will prevent wildlife from getting tangled in them. Toss the mask in a garbage can with a secure lid.

This is especially important if the trash is outdoors. Masks are easily carried away by the wind. Recycling such PPEs would be a great solution. 'PLAXTIL'a French company has already recycled 70,000 face disposable masks and turn them into a raw material to produce various plastic products. The remaining PPE which would neither be reuse nor recycle must be incinerated for the purpose of restoring an ecosystem.

This is the right time to **REIMAGINE** about the **PPE** pollution, **RECREATE** new product from **PPE** waste, and **RESTORE** our ecosystem.

Author is an Editor-in-chief at The Environment Review



Microbes:

Can be the Best Solution for Environmental Pollution

Deapika Paul

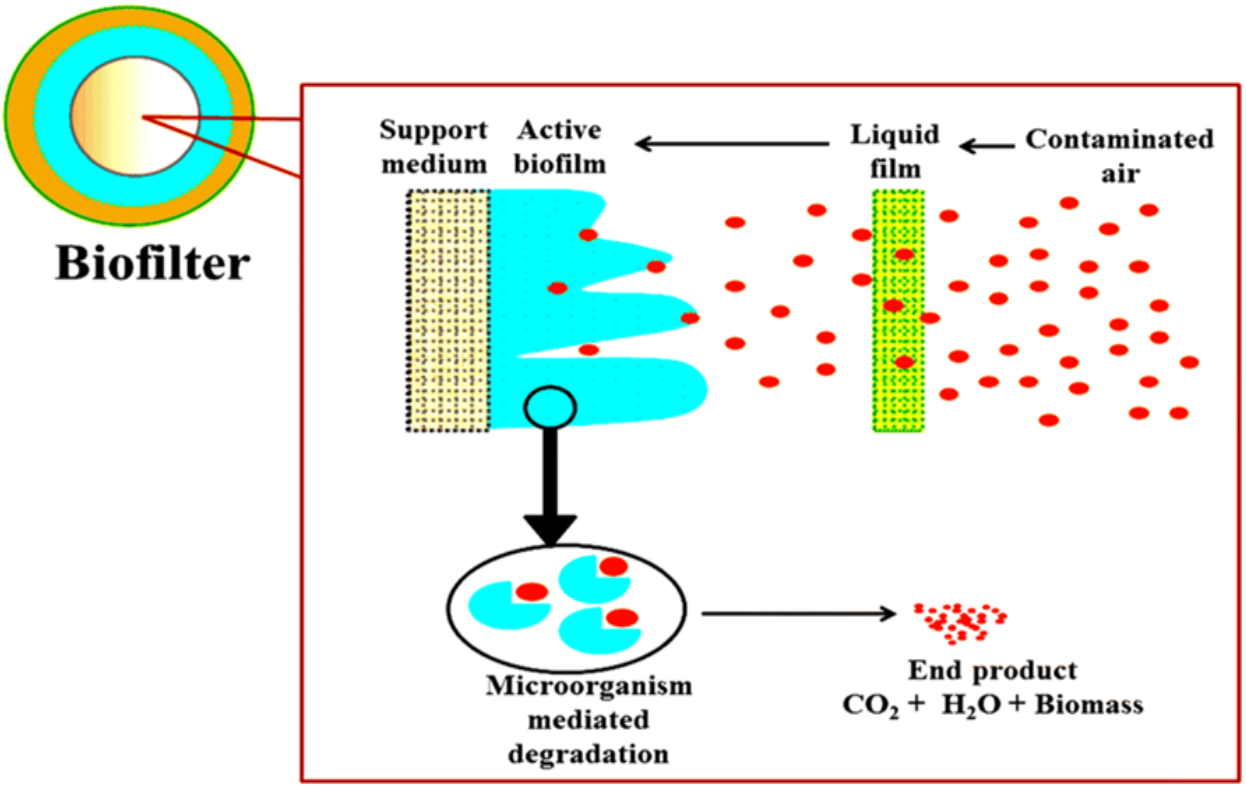
Microorganisms are known for their ability to adapt any environment. We can find them in the most hazardous places on Earth. Their invisible work has led to visible results — terraforming the planet billions of years ago and converting it into the viable green world that is today. Their ability to utilize and adapt to any available substrate in order to gain energy kept the balance in the ecosystem until humans become dominant species. Since the industrial revolution, human activity has produced a broad range of novel substances to which microorganisms can naturally adapt. The problem is that biodegradation can't keep pace with the amount of substances being produced. Thankfully modern science offers a technology which employs microorganisms' adaptability. It is called bioremediation.

Bioremediation is a biotechnology procedure, in which microorganisms adapted to degrade pollutants from a contaminated site are stimulated to achieve a better biodegradation rate by enrichment with fertilizers and/or oxygen. Another variation of the technology is introducing microorganisms adapted in a laboratory into the

contaminated site. Microorganisms are utilized in bioremediation because of their ability to degrade environmental pollutants due to their metabolism via biochemical pathways related to the organism's activity and growth. Bioremediation uses micro-organisms to reduce pollution through the biological degradation of pollutants into non-toxic substances. This can involve either aerobic or anaerobic micro-organisms that often use this breakdown as an energy source. There are many categories of bioremediation techniques.
These are –

Soil Treatment:

Introduction of new microbes, 'biostimulation' techniques increase natural degradation processes by stimulating the growth of microbes already present. Natural biodegradation processes can be limited by many factors, including nutrient availability, temperature, or moisture content in the soil. Biostimulation techniques overcome these limitations, providing microbes with the resources they need, which increases their proliferation and leads to an increased rate of degradation. Cleaning up oil-polluted soil is an example of where stimulating microbial growth can be used to good effect. Research has shown that poultry droppings can be used as a biostimulating agent, providing nitrogen and phosphorous to the system, which stimulates the natural growth rate of oil-degrading bacteria .Systems like these may prove cheaper and more environmentally friendly than current chemical treatment options.



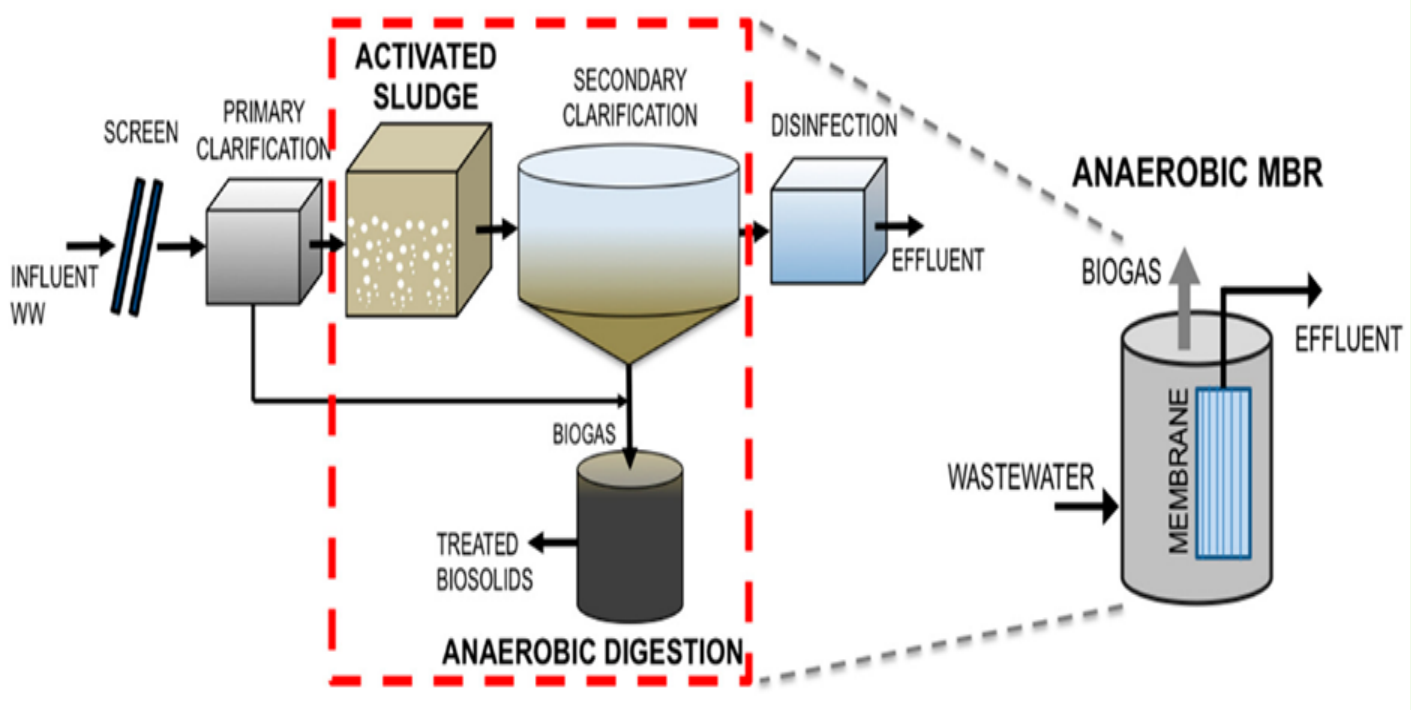
Source: Researchgate

Air Treatment:

Air is polluted by a variety of volatile organic compounds created by a range of industrial processes. While chemical scrubbing has been used to clean gases emitted from chimneys, the newer technique of 'biofiltration' is helping to clean industrial gases. This method involves passing polluted air over a replaceable culture medium containing micro-organisms that degrade contaminates into products such as carbon dioxide, water or salts. Biofiltration is the only biological technique currently available to remediate airborne pollutants.

Water Treatment:

Anaerobic digestion such as bioreactor process is the biological fermentation of organic matter. Organic materials are converted into biogas, which helps to reduce pollutants and contaminants from the water. Anaerobic treatments are used to alter



Source: mdpi

the chemical composition of the organic material found in wastewater to make it more environmentally friendly.

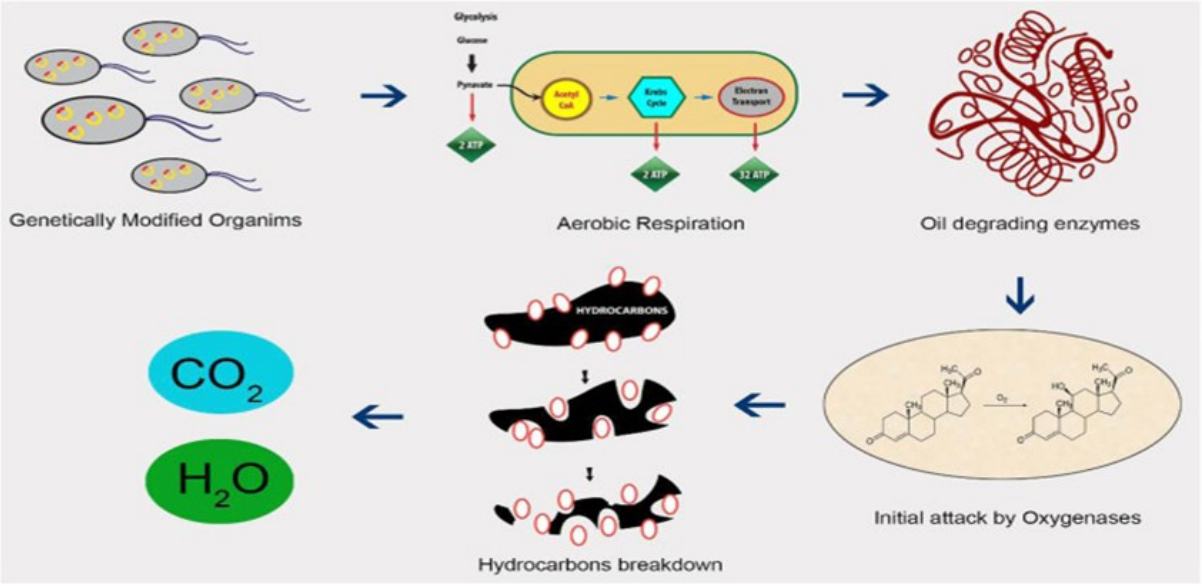
Petroleum Pollution Control:

Biopiles, similar to bioventing, are used to reduce petroleum pollutants by introducing aerobic hydrocarbons to contaminated soils. However, the soil is excavated and piled with an aeration system. This aeration system enhances microbial activity by introducing oxygen under positive pressure or removes oxygen under negative pressure.

Removing Heavy Metal:

Industrialization has led to introduction of heavy metals in the environment. Heavy metals are known to persist in the environment and become a risk for organisms. Micro-organisms are present in industrial effluents. They have adopted different strategies to cope up with the harmful effects of these metals. These strategies can be metabolism dependent or independent. One such strategy is biosorption which is binding of metal ions with metal binding proteins present on the cell wall. Biosorption is exhibited by bacteria, algae, fungi and yeasts. Not only living organisms, but also residuals of dead bodies of microorganisms shows bio sorbent properties like agricultural wastes including husk, seeds, peels and stalks of different crops. Different factors affect the rate of biosorption which includes temperature, pH, nature of bio sorbents, and surface area to volume ratio, concentration of biomass, initial metal ion concentration and metal affinity to bio sorbent.
The main microbes which are usually used in bioremediation are- Pseudomonas putida, Dechloromonas aromatica, Deinococcus radiodurans, Methylibium petroleiphilum, Alcanivorax borkumensis, h chrysosporium.
The use of genetic engineering to create organisms specifically designed for bioremediation is under preliminary research. Two category of genes can be inserted in the organism: derivative genes which encode proteins required for the degradation of pollutants, and reporter genes that are able to monitor pollution levels.Numerous members of Pseudomonas have also been modified with the lux gene, but for the detection of the polyaromatic hydrocarbon naphthalene. A field test for the release of the modified organism has been successful on a moderately large scale.

There are concerns surrounding release and containment of genetically modified organisms into the environment due to the potential of horizontal gene transfer. Genetically modified organisms are classified and controlled under the Toxic Substances Control Act of 1976 under United States Environmental protection Agency. Measures have been created to address these concerns. Organisms can be modified such that they can only survive and grow under specific sets of environmental conditions. In addition, the tracking of modified organisms can be made easier with the insertion of bioluminescence genes for visual identification.



Source: Sciencedirect

Genetically modified organisms have been created to treat oil spills and break down certain plastic.

Bioremediation is not a new technique, but as our knowledge of the underlying microbial reactions grow, our ability to use them to our advantage increases. Frequently, bioremediation requires fewer resources and less energy than conventional technology, and doesn't accumulate hazardous by-products as waste. Bioremediation has technical and cost advantages, although it can often take more time to carry out than traditional methods.

Many microorganisms can break down metals naturally, but this is not a sufficient solution on a global scale. Therefore, as a means to resolve this problem, engineered microorganisms can be developed with the help of genetic engineering. A better understanding of the way in which both eukaryotes and prokaryotes metabolize heavy metals and the detoxification pathways will help future researchers to deal with this type of environmental problem with maximum efficiency. The choice of the most promising type of biomass must be made, taking into account its cost and availability, and this is necessary on an industrial scale.

The microorganisms should be easy to obtain and to cultivate. For example, industrial-scale application would not be of interest if the microorganism is difficult to cultivate, a rare species or a species in danger of extinction.

Although some progress has been made in the recognition of the importance of microorganisms for the decontamination of polluted waters, some important points still need to be addressed. However, a new challenge has emerged for science. Thus, further studies need to focus on the development of new clean environmentally acceptable technologies with commercial feasibility.

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Volume 2 Issue 3
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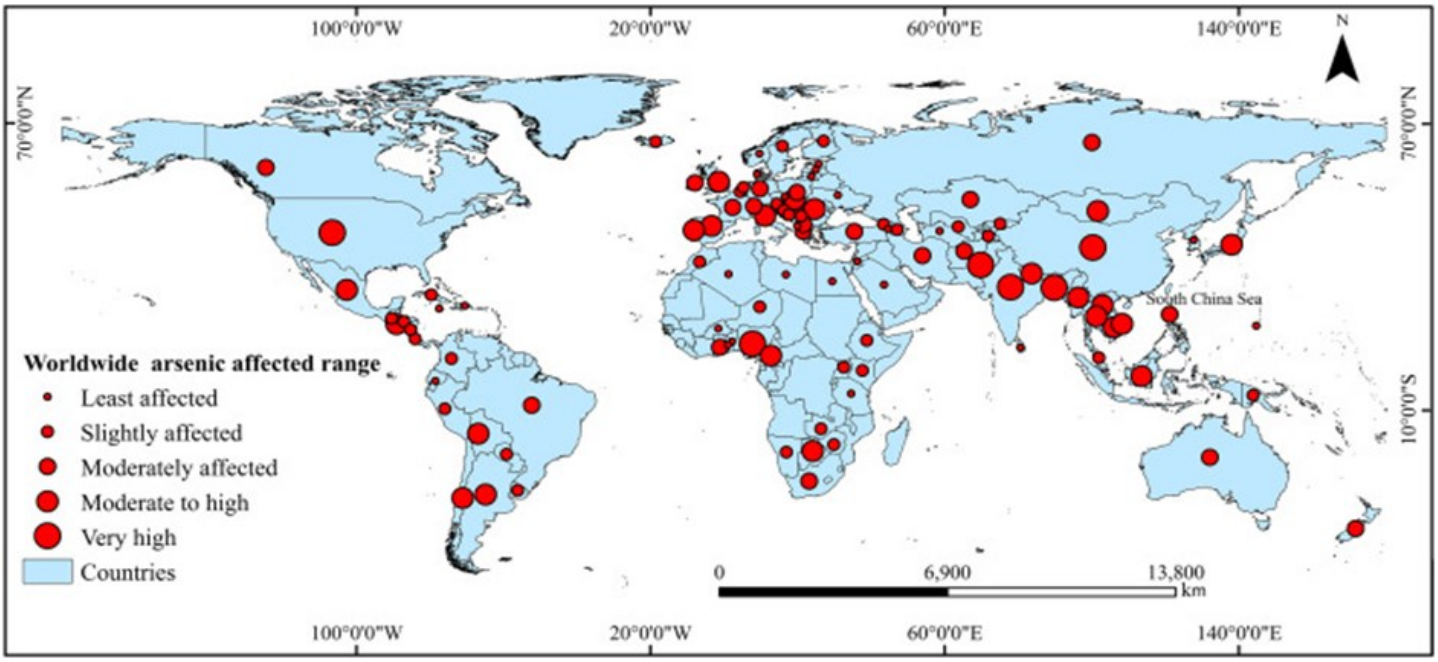
Arsenic Contamination: An Overview

Md. Arafat Rahman



Water is another name of life. Today, life-saving water is being poisoned by arsenic. Arsenic-contaminated water poses a serious threat to public health. People are slowly dying by drinking arsenic-contaminated water. Even 30 years ago, the country's shallow tube well water was pure, but gradually it was contaminated with arsenic. According to experts, there is no cure for arsenic poisoning.

Arsenic is a toxic mineral element. It has no taste or smell. Arsenic is used to make semiconductors and alloys. As a basic substance, it does not dissolve in water and is not toxic. But when oxides are formed in the air, it becomes toxic. Arsenic is a semi-metal or by-metal of brittle nature with a grayish white color. Nature's arsenic is not harmful to public health in most cases. However, in recent times, man-

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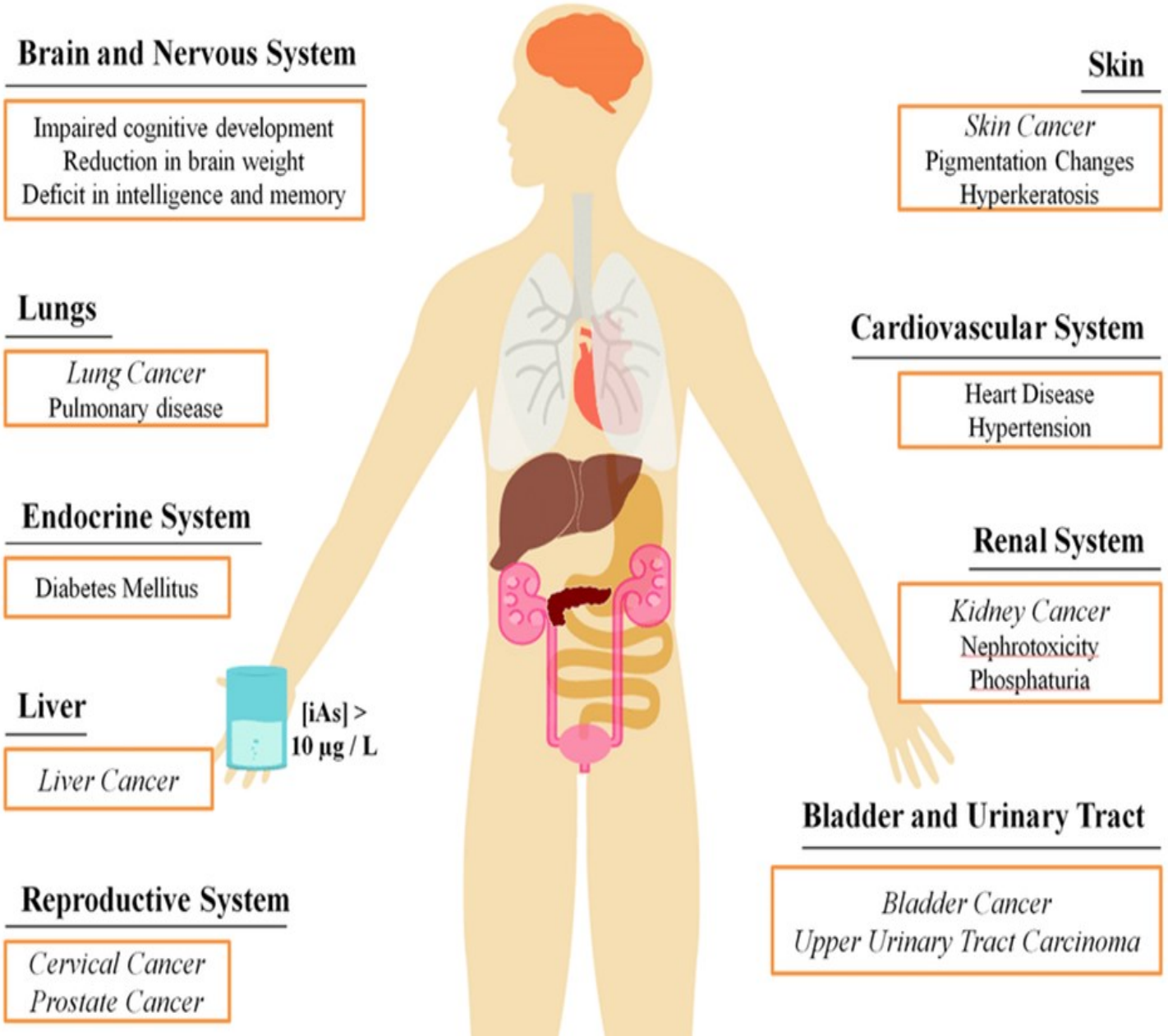
made activities have increased the concentration of arsenic in the environment and the air, soil and water in different parts of the world have become contaminated with arsenic, causing a variety of serious health problems. Arsenic and arsenic compounds are being used in various ways for human welfare, but in excess of certain amounts it can be fatal. Naturally arsenic is present in very small amounts in nature but the intensity of arsenic may increase, such as the emission of metal extraction reactors. The arsenic concentration in river water is lower than normal, but there are exceptions in areas where geothermal water or mines are extracted.

A small amount of arsenic can be found in the human body, soil and sea water. More arsenic is observed inside the soil than on the surface. There is a layer of rock beneath the soil that contains a compound called pyrites. Arsenic exists in this compound. However, the most arsenic is found in the crust of the rock. Arsenic sulfide, oxide and arsenide are considered to be the main sources of arsenic. The main source of arsenic in our country is tube well water. Arsenic pollution in Bangladesh has reached at an alarming proportion. Arsenic is stored in a special layer under the soil and is pumped out through tube well water. Over the past few decades, the use of chemical fertilizers and pesticides in agricultural production has increased dramatically, polluting rivers, canals, and seawater. This excessive use of chemical fertilizers and pesticides is one of the causes of arsenic contamination. The special layer of soil that contains a substance called arsenopyrite is being mixed with water due to the extraction of excess water from the ground. The billions of liters of water we pump out for daily use, starting with agriculture, create a temporary vacuum in the groundwater that mixes arsenic with water mixed with air and oxygen. The cause is arsenic pollution.

Arsenic pollution is a global problem. High levels of arsenic have been detected in groundwater in about 50 countries on all continents. Since the first detection in Taiwan, arsenic contamination has been gradually identified in many countries around the world. The most polluted areas are Latin America (Argentina, Chile, Mexico, Nicobagua and other countries); Southeast Asia (Vietnam, Cambodia, Thailand, Laos, Myanmar)

and South Asia (Bangladesh, India, Nepal, Pakistan). In addition, the United States, Canada, Spain, Italy, Germany, the United Kingdom, China, Brazil, Australia, New Zealand, etc. countries



have different levels of arsenic pollution. Bangladesh is considered to be the most polluted country in terms of the affected or at-risk population.

The first report of arsenic contamination was found in India in 1986. In some parts of the northern and southern parganas of India, the effects of arsenic on the human body are noticeable. It was later identified in different countries of the world. Symptoms of arsenic in the human body do not appear immediately. In many cases the symptoms appear after 6 months or more. Its toxicity is based on the amount of arsenic in the water. If anyone drinks the high amount of arsenic mixed water for a long time, its symptoms appear quickly. At first, brown spots are seen on the body or palms of the hands. Later on, the fingers start to rot. Many times the reaction to arsenic causes the skin on the soles of the feet to thicken and the toes to bend.

People with arsenic can get cancer. Redness is seen on the tongue, gums and lips of arsenic in-

fected patients. Feeling anorexia, lossing of appetite and nausea also seen. Gradually the heart becomes inactive. The amount of white and red blood cells in human blood decreases. Many times the blood vessels are damaged and there is severe damage to the fetus in pregnant women. Arsenic contamination in Bangladesh has made people think. The level of arsenic contamination has increased drastically. The presence of arsenic in the groundwater of Baragharia Union of Chapainawabganj district was first discovered in 1993 in our country.

The 'Bangladesh Arsenic Mitigation Water Supply Project' (BAMWSP) was launched with the responsibility of implementing data collection, analysis, storage and pollution mitigation strategies on arsenic centrally. The most comprehensive and systematic survey on arsenic contamination in Bangladesh so far was conducted in 1998-99 by the British Department of Public Health and Engineering in collaboration with the British Geological Survey and Mott MacDonald Limited. Two different methods are usually used in Bangladesh for testing arsenic levels in groundwater. The first one is called 'Field Kit Method'. It is a method of qualitative to semi-quantitative type. Tested water in this method is classified into two types - safe and unsafe. The second method of arsenic testing is laboratory analysis. It is completely quantitative and contains the exact amount of arsenic in groundwater. Since 1993, extensive groundwater samples have been tested using both field kits and laboratory methods.

Under the BAMWSP project, about 5 million tube wells have been tested in 260 upazilas of the country out of which arsenic has been detected in 26% of the tube wells above the Bangladesh standard. Besides, the Department of Public Health Engineering has surveyed other areas of the country in about 190 upazilas. At present arsenic contamination maps have been made across the country to show that the presence of arsenic is much higher in the southern part of the country. However, analysis of village, union and upazila based results shows that in some areas tube wells are 100% free from arsenic contamination and in some areas 100% free from pollution.

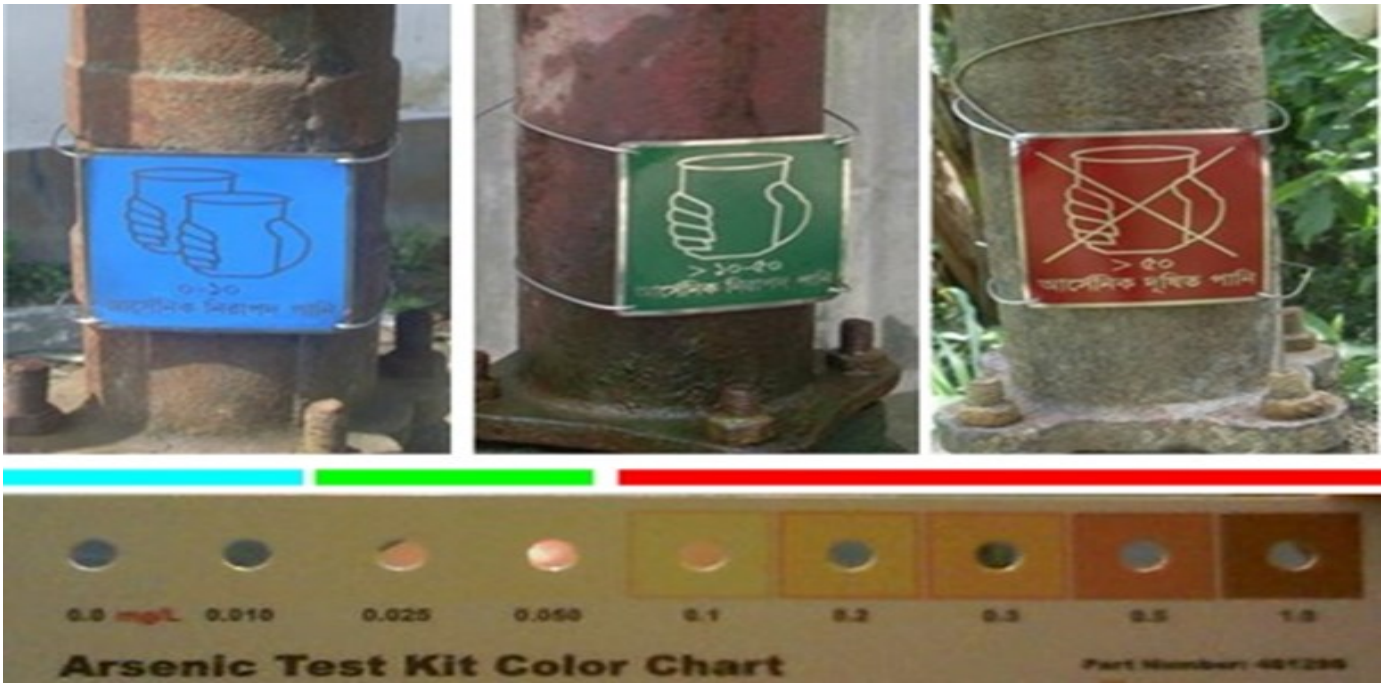
Then in 2001, the British Geological Survey tested tube well water in 61 districts of Bangladesh

and found that 42% of tube well water contained levels of arsenic higher than the World Health Organization standard. According to a 2008-09 survey by the Bangladesh Department of Health, the number of arsenic infected patients was 19,165 in Chittagong Division, 8,315 in Khulna Division, 5,552 in Dhaka Division, 4267 in Rajshahi and Rangpur Division, 788 in Barisal Division and 233 in Sylhet Division. The level of arsenic contamination in Bangladesh is higher than other neighboring countries. The most polluted districts in Bangladesh are Chandpur, Munshiganj, Gepalganj, Madaripur, Noakhali, Satkhira, Comilla and Bagerhat. The least polluted districts are Thakurgaon, Panchagarh, Natore and Nilphamari.

Prevention is currently the most effective way to get rid of arsenic poisoning. Scientists have not yet discovered the treatment of arsenic-infected patients. The World Health Organization (WHO) report said that 0.05 mg of arsenic is tolerable for the human body, but the current report says that if the level is more than 0.01 mg for Bangladesh, it will be harmful to health. Therefore, more importance should be given to prevention and remedy. Studies have shown that arsenic levels are higher in shallow tube well water. Especially at a depth of 100-200 meters the presence of arsenic is low.

The following steps can be taken to prevent and remedy arsenic contamination-.

- Deep tube well water should be used for food and cooking.



- Rainwater does not contain arsenic. So rain water should be stored and used.
- Awareness of arsenic through radio, television and rural rituals.
- There is no arsenic in the water of ponds and canals. In this case, the water of ponds, canals or beels should be filtered and boiled for 20 minutes.
- Water should be provided by digging new ponds in arsenic affected villages.
- Establishment of arsenic treatment plant through government assistance.
- Tube well water should be tested from time to time through various government and non-government organizations.
- Purification of water with buckets, pitchers and fly ash invented by SOES, CSIR through

filters.

- Arsenic-containing tube wells should be marked with red color to stop drinking water from them.
- Arsenic is not a contagious or contagious disease, so without panic consulting a doctor.

At present, various organizations are working on arsenic in Bangladesh. In November 1996, representatives of the Dhaka Community Hospital visited several districts of the country and went to Calcutta for sample testing. Later in 1997,

Rajshahi University conducted another survey in 15 districts. At that time, the Department of Geology and Mining of the University collected water samples from 600 places in the border districts of West Bengal in Bangladesh and sent them to Jadavpur University. Finally, the School of Environment, University of Jadappur, India and NIPSOM, Bangladesh jointly conducted experiments in 17 districts of Bangladesh to find the level of arsenic contamination.

A 2010 report by the Bangladesh government and UNICEF on 54 districts found that 233 upazilas, 2,000 unions and 31,497 villages in 47 districts were affected by arsenic.

A 2010 report by the Bangdesh government and UNICEF on 54 districts found that 233 upazilas, 2,000 unions and 31,497 villages in 47 districts were affected by arsenic. According to the Asia Arsenic Network Jessore, the number of people infected with arsenic in Jessore district alone is about 3,000. In some villages of the upazilas of Jessore district 60% of the people are affected. Since arsenic is not a contagious disease, we need to consult a doctor without panic. We need to raise awareness among the people. Steps must be taken to stay free from arsenic at the personal, family, social and village levels. Public and private support needs to be increased. Arsenic enters the human body through drinking water, so it is needed to drink arsenic-free pure water. Steps should be taken to eradicate this disease like tuberculosis, cholera, smallpox etc. People need to be aware and the government needs to make arrangements to provide safe clean water in arsenic affected areas.

Arsenic contamination in groundwater is not a new health problem for mankind. However, the problem is new in Bangladesh and the high level of pollution is an exception. Being a densely populated country, the problem has become more pronounced. As the most conservative, it is seen that about 30 million people in Bangladesh today are in the grip of arsenic disaster. It is difficult to solve this problem and provide alternative safe drinking water for this huge population. Which areas need to be considered on an emergency basis and which areas can be excluded is clear from the arsenic contamination map.

Several alternative methods of arsenic removal are described above, such as domestic filters, community-based arsenic treatment plants, deeper tube wells, surface water use, and rainwater harvesting. No one particular method is applicable for the whole country, but different strategies can be applied for different regions to ensure safe drinking water supply. Despite various measures, arsenic problem remains a major public health problem in Bangladesh. A significant number of people are still at risk of arsenic exposure.

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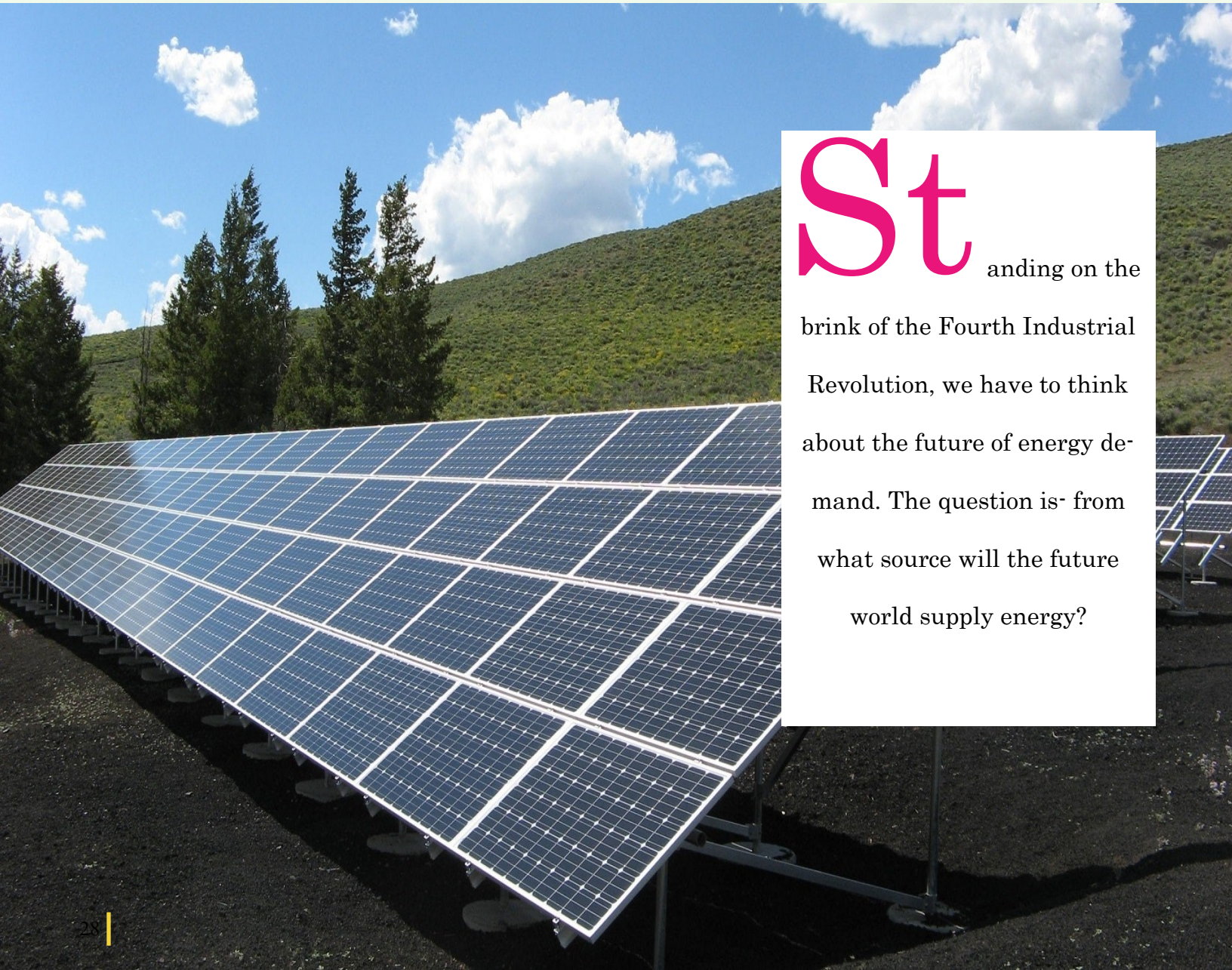
June – 2021, Special

Solar Energy will Meet the Future Energy Demands of the Earth.

Alok Acharja



Standing on the brink of the Fourth Industrial Revolution, we have to think about the future of energy demand. The question is- from what source will the future world supply energy?

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We have to think about power generation. Because the people of the world have realized that, the civilization- that has been dependent mostly on oil, coal and gas for a long time is under threat of pollution caused by these substances. In today's world, energy production depends on renewable energy such as oil, gas and coal for a long time.

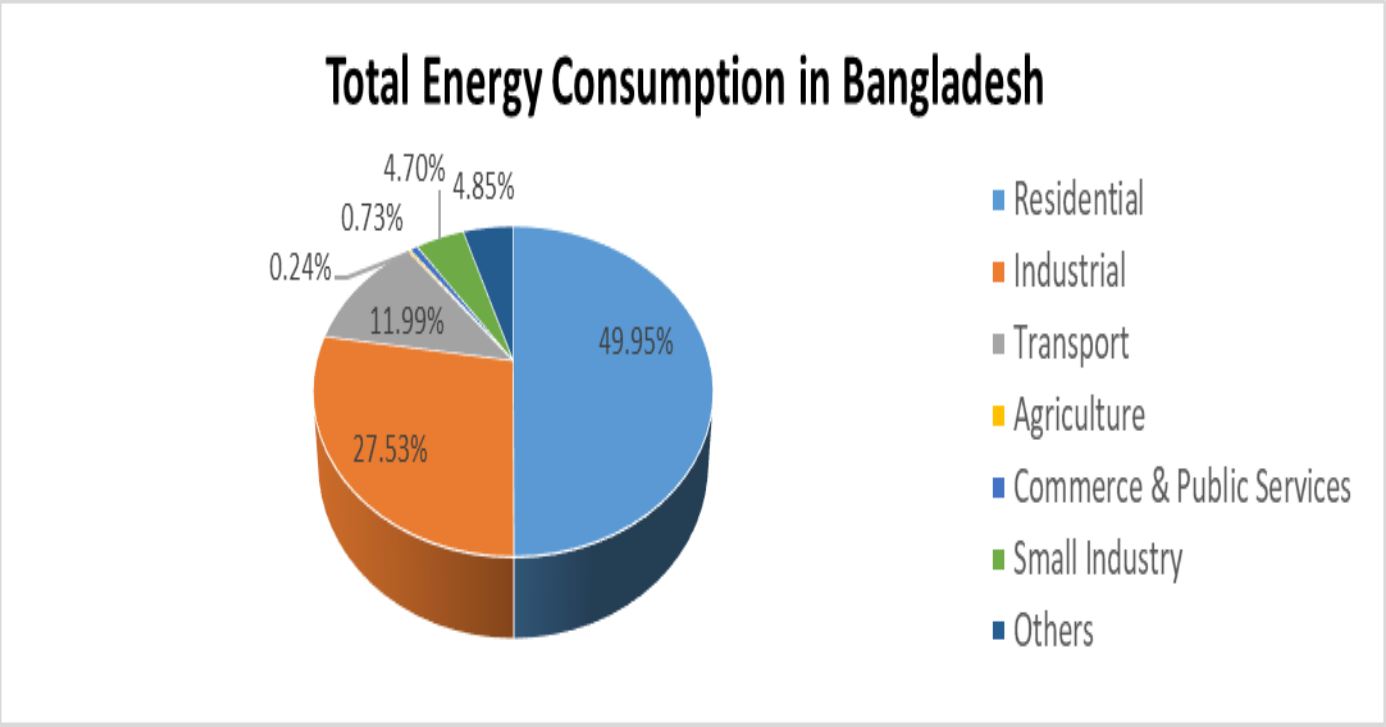
The development of civilization began its journey by using these fuels. With the passage of civilization, great progress also made in science. People realize that the elements of energy that are being used extensively will one day run out from the earth. The world is moving very fast. Realizing this importance, scientists have been emphasizing the use of alternative energy for many years. The main source of energy is the sun. The main goal of human beings is to meet the energy needs by using the heat of the sun which is known as solar energy.

The use of solar energy is increasing all over the world gradually. Our country is not backward either. Solar panels are currently being used to generate electricity for everyday household uses. The fan is spinning, the TV is running and other electronics are also running using solar energy. Solar power has been used for a long time, especially in remote areas where it was difficult to get electricity once. These solar panels are a collection of numerous photovoltaic cells that convert the sun's light energy into electrical energy.

As the population grows, so does the use of fossil fuels. As a result, significant resources like natural gas are almost at an end. The situation is the same in our country. Natural gas is an extensive source of energy used for factories, including power generation. Solar energy is the first choice as a sustainable alternative fuel. From which the human race will be able to produce energy for ages and will not be exhausted. The use of solar energy in various countries like America, China, Japan, Germany, and India is much advanced.

Image: solar energy increasing in rural area (Photo Credit: Tuhin)

Today, houses are illuminating through the use of solar energy. Hat-bazaar is being lighted. Today electricity has reached all parts of Bangladesh. The government has also extended electricity facilities to remote areas of the country. But when electricity did not reach those remote areas, those places were illuminated by solar power. Using solar power, it is possible to run not only houses but also small manufacturing factories.



According to a report of the World Bank, Bangladesh is ahead in the world in the expansion of solar power. The main problem in the world today is global warming. The most responsible for global warming is the use of fossil fuels such as coal. Researchers say that in the developed world, up to 10 per cent of the world's electricity demand is being met by using renewable energy using wind and solar energy. This has reduced the use of fossil fuels. Scientists say the change in fuel consumption has also significantly reduced the rate of greenhouse gas emissions into the atmosphere.

Many countries in the developed world are now turning to use solar or wind energy instead of fossil fuels. At present, the contribution of solar power to the global growth of power generation is 70 per cent. The combined contribution of solar photovoltaic (PV) and wind to the global growth of power generation will reach 30 per cent by 2030. In 2019, this contribution was 6 percent. Utilizing solar energy, the government has undertaken projects like solar parks, solar mini grades and solar irrigation in different parts of the country. It is possible to meet a large part of the future energy by using solar energy.

The people of the world now want to protect the world from greenhouse gas. That is why the impact of greenhouse gases must be reduced. That will be possible if the industry runs on energy from renewable sources. Many countries are using solar energy to run buses as part of the test. Even if it is not widespread now, this effort will gradually lead to success. From the end of the twentieth century, other sources of renewable energy such as solar energy began to be used in Bangladesh. Before 2008, the number of solar home systems in the country was less than three lakh.

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Due to several subsequent steps, the number of solar home systems in the country was 3 million in 2014 alone. According to the master plan for power generation taken in 2010, renewable energy will be 10 percent of the total power generation in 10 years. Bangladesh now ranks second in the world in the use of solar power at home.

According to a report by the International Renewable Energy Agency, a global organization in the renewable energy sector, Bangladesh ranks fifth in the world in terms of job creation in the solar sector. The world's largest solar park is being built in Gujarat, India. The target has been set to generate 30,000 MW of solar power per year.

Every country is using solar energy to create electricity generation facilities that will ensure sustainable energy supply in the future. At the same time, the world will be as clean as before.

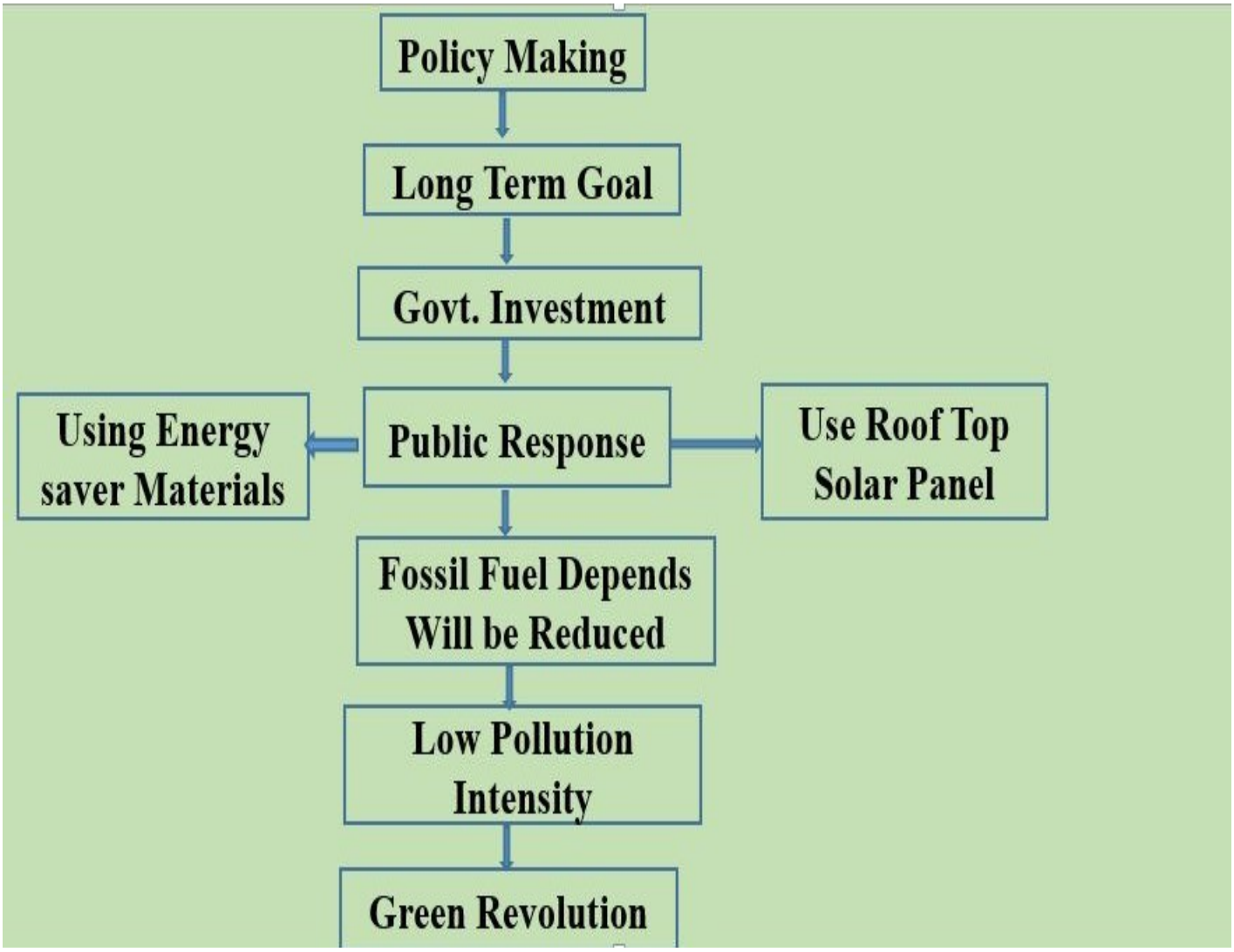

Figure : Sustainable process flow diagram for solar energy uses (tuhin et al 2019)

We have to think about power generation. Because the people of the world have realized that, the civilization- that has been dependent mostly on oil, coal and gas for a long time is under threat of pollution caused by these substances. In today's world, energy production depends on renewable energy such as oil, gas and coal for a long time.

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Volume 2 Issue 3
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Recent Sudden Temperature Rise In Bangladesh

Taposhi Habiba

Bangladesh is one of the largest deltas in the world. It is formed by a dense network of the distributaries of the rivers Ganges, Brahmaputra and the Meghna with more than 230 major rivers, tributaries and distributaries. Almost over half of Bangladesh is north of the Tropics and the climate is characterized by high temperatures, heavy rainfall, high humidity and fairly marked seasonal variations because of the Himalayan Mountain Chain. There are kind of three seasons in Bangladesh: a hot sumer season, a hot and humid monsoon season, a cooler and drier winter season.

But nowadays, the change in temperature of the weather seems to be a cause of much concern. The sweet glow of the soft sun of the morning seems to be disappearing in an instant. Morning is starting with the bright sun and by noon it is becoming unbearable. The people of Dhaka has witnessed such unbearable heat in the last 20 years. The temperature rise is almost 3 0C which is leading

us towards a terrible future of climate change. The Meteorological Department has a record of temperature for the last 73 years. The highest temperature in Dhaka so far in the last 73 years is 42.3 degree Celsius. On April 25, 2021, the temperature of Dhaka was 42.2 degree Celsius. In April the normal maximum temperature remains at 33.6 degree Celsius. But this year the maximum temperature in April is 36.3 degree Celsius. Apart from Dhaka, Rajshahi, Chattogram, Khulna, Barishal and Sylhet have seen significant changes in temperature during day and night. Which is currently a matter of much concern. Why this sudden change in the weather? And is this change sudden or the cause of our unconsciousness for a long time?

Why are these happening?

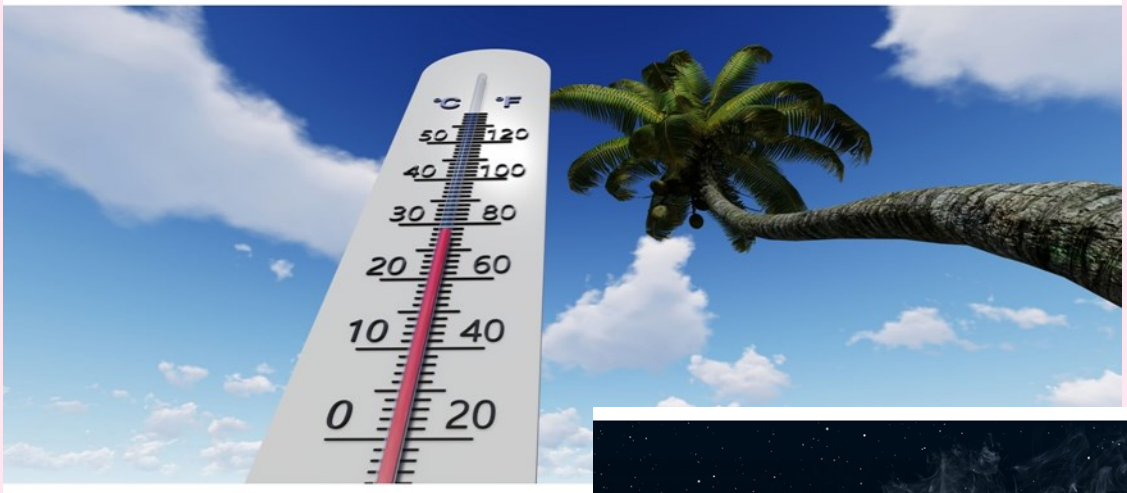
The first thing that comes to mind from these incidents of sudden temperature changes, low rainfall is climate change. The climate of Bangladesh has changed a lot in the last few years. This is also due to the geographical location of Bangladesh. The atmosphere of Bangladesh is warmer in April and May than at other times of the year. At this time, the slight aqueous vapour coming from the south over Bangladesh lowers the temperature. But this time the south wind has come very rarely.

That is why the amount of rainfall has been less than half of the normal. And this is why the temperature is higher at this time. It can also be called the cause of climate change. Population density, lack of greenery, uneven building heights, overuse of air conditioners and other human activities are also some of the reasons for the rise in temperature in the densely populated cities of the country. Besides waste heat from vehicles, buildings and industrial areas are also exacerbating the problem of rising city temperatures.

A survey conducted by SUHII (Surface Urban Heat Island Intensity) where the temperature of five cities was taken twice regularly from 2000 to 2019, said that big cities like Dhaka and Chattogram have a higher temperature than the smaller cities.

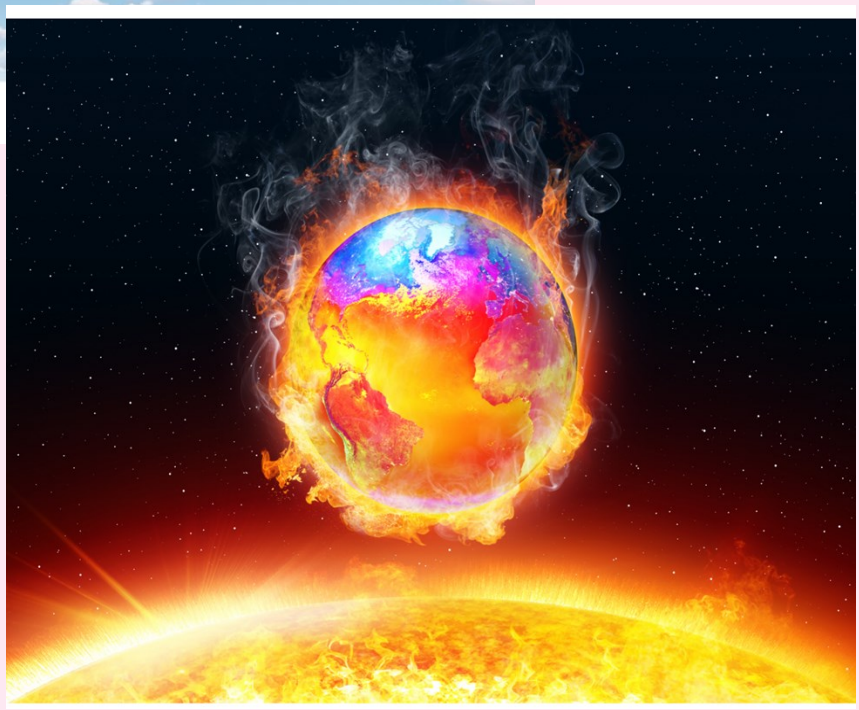
According to the United States Environmental Protection Agency, urban heat islands occur when the city's natural landscapes are covered with a variety of dense concentrations of pavement, buildings and other structures that absorb and retain heat. As a result, energy costs (such as air conditioning), the amount of air pollution and a

variety of temperature-related diseases increase.



What will happen shortly?

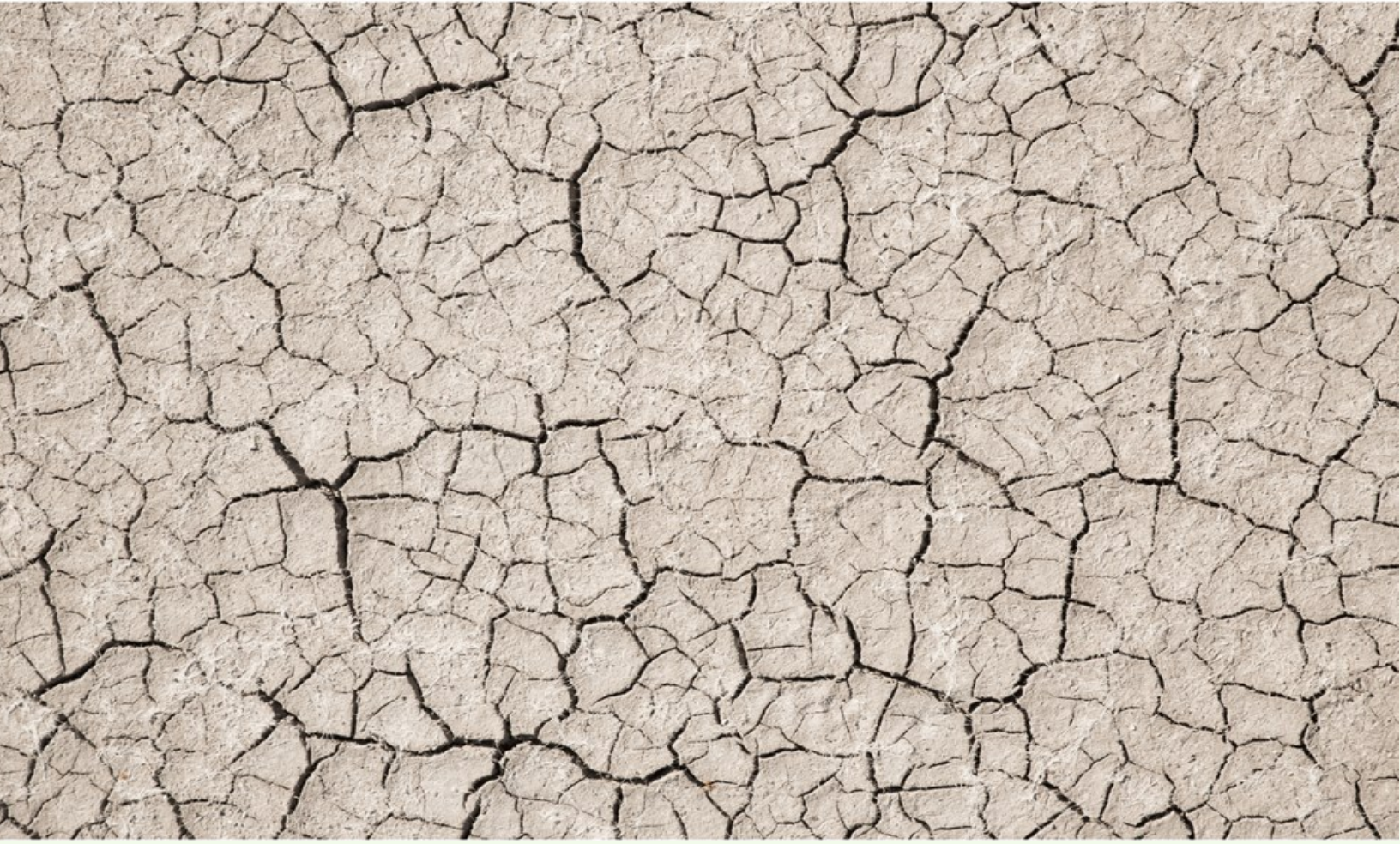
Thus it is needless to say that, if the population density and the density of buildings in the cities and the amount of deforestation continue to increase, then shortly Bangladesh will become an almost uninhabited desert. The choices we make now will determine what the average global temperature will be in the coming ages. If people continue to increase the number of greenhouse gases in the atmosphere, destroy vegetation and become more attracted to urbanization, the Earth's temperature could be rise by 4 to 120 F by the year 2100. And if we can make big changes like using renewable energy instead of fossil fuels and power plants then the amount of temperature increase will be less about 2 to 50 F.



If the temperature continues to rise in this way, it will cause huge damage to agriculture, health and productivity in Bangladesh. These temperature rising are causing droughts in the villages which is causing massive crop damage. Rainfall is low in April. As much it rains, different crops grow. But if this continues, rainfall will decrease, which will cause drought in future. As Bangladesh is an agricultural country it can cost Bangladesh 6.7 percent of Gross Domestic Product and depress the living standard of more than three-quarters of the population by the year 2050.

Hartwig Schafer, Vice President for South Asia Region, said, "Around the world, especially for Bangladesh climate change is an acute threat to development and efforts to end poverty. In addition to the coastal zones, the warming weather will severely affect the country's inland areas in the next decades. To deal with climate change, the country needs to focus on creating jobs outside the agriculture sector and improve the capacity of its government institutions. The World Bank is committed to helping Bangladesh become more resilient to climate change."

Muthukumara Mani, Report author and World Bank Lead Economist in the South Asia Region, says "These weather changes will result in lower per capita consumption levels that could further



increase poverty and inequality in one of the poorest regions of the world, South Asia,"

By the year 2050, the Chattogram division will be the most vulnerable due to climate change. Seven of the top ten affected hotspot districts where average temperature and rainfall changes will harm life will be highest in the Chattogram district. The top two climate hotspot likely will be Cox's Bazar and Bandarban, which could reduce their standard of living by 18 percent and more, followed by Chattogram, Rangamati and Noakhali.

What should we do?

The most talked about topic in the world is global warming. But is it possible to change it through negotiation? Necessary steps need to be taken along with the discussion. Increasing the use of renewable energy, reducing the use of energy, reducing engine-driven vehicles, using recyclable materials that can be reused, including metal waste etc., can be some of the initial steps. Above all, the amount of carbon in the atmosphere must be reduced. That means planting more trees and cutting down trees should be stopped completely. The rainy season is the best time for Bangladesh to plant trees. It is necessary to ensure that more trees are planted during the rainy season. Different geographers have given different opinions to reduce the heat of the city area of Bangladesh. Among them, they have emphasized increasing the amount of greenery in areas of the city where the amount of heat trafficking is higher than increasing the amount of vegetation in different places.

And the most important thing is to create awareness among the people. Most of the people in Bangladesh are not aware of global warming, for which some problems are not being overcome. In this way, it is possible to gradually eliminate the problems caused by global warming.

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Corona: Ally or Foe to Biodiversity?

Probal Talukder

It has been now a century that world has faced millions of deaths. In year 1918, a pandemic broke out and made massive destruction, Spanish flu which is also known as influenza took away approximately 100 million of lives. Now the globe is also in a destructive period as the corona virus has broken out and lives are in an endangered situation.

It has taken away 3.31 million of lives and 159 million new cases before 12 May 2021. So, we have to remain in our houses and follow the safety precautions to fight against

Source: Stockholm Environment Institute

this demon. But it's not the topic. Every object of this world has two faces, one is positive and the other one is negative.

Biodiversity refers to the biological diversion of environment and the term includes terrestrial atmosphere, marine atmosphere, aquatic atmosphere and some others. All the atmospheres above mentioned haves their own characteristics and all of them are holding a biodiversity of its own. But in together they maintain a balanced chain of biodiversity for a particular place or region. Chemical, physical and biological changes in these environs and the transformation of living and non-living organisms and micro-organisms according to these types of particular changes maintain a chain of acclimatization.

By this type of transition and adjustment process a geological and biological relation remains balanced. In short, the adjustments of living and micro-organisms according to the geological formation and abiotic form factors keep a balance which is known as biodiversity. Sometime this chain gets imbalanced or there are some messes in the relational chain of elements. Some factors are responsible in this regard. Mostly the catastrophic agents like floods, volcanos, hurricanes and sometime deadly diseases are mention worthy, But Sometime human activities surpass.

Soil, air and water are the main elements in our planet. For the better progress of life their quality should be preserved at a safety level. But after the industrial revolution started in 18th century the quality of these elements decreased and the deterioration is still now going on. The alarming rate of pollution puts a stamp mark over the existence of living organisms. But during this pandemic situation we have observed a temporary change over the elements and noticed the decline of pollutions.

Water, well known as life to the living organisms has been contaminating from year to year. Industrial, household, farming insecticides and some other agents are contaminating water with wastages and chemical agents. But from the arrival of corona, it faces a fatal consequences form all industrial site was closed. People are remaining in their houses. Water vessels are not plying because there is no international or national transportation. This lockdown situation has created a good impact over the riverine and oceans. Grand canal of Italy turned clear. Ganges one of the most polluted river of India got revived during this coronal period. Vembanad lake, a Ramsar site passed by a examine as a part of case study, researchers found that the SPM (Social Performance Management) level is decreased to 15% and as the day passed in April, 2020 the level declined to 34% from previous. As a result, there are reappearances of many aquatic species. Oxygen level in water got balanced again. No waste in the water has encouraged the Revival of phytoplankton and zooplanktons which are a great source of food to fishes. As a result, the proper growth and reproduction process happened. Reappearance of aquatic animals and other organisms made a change in the aquatic biodiversity and rise of a new food chain took place.

Air is one of the most significant elements for existence. But what if the air is polluted? The answer is known to us. We are facing this extreme situation for a long time now. But a matter of temporary alleviation raised up when the Covid-19 pandemic broke out. All the workplaces, industrial sites are closed to prevent the extreme situation of destruction, lockdown is implemented. In result we found the reduction of air pollutant particles and some toxic gases.

Nitrogen dioxide is an air pollutant which is mainly produced by fossil fuels, industrial activities and transportation. In Wuhan the reduction

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level of such activities and elements is 60% in Milan same as Wuhan, in New York the percentage is 45%. In Dhaka, capital of Bangladesh the concentration of pollutant particles like $PM_{2.5}$, NO_2, SO_2 and CO in air have been reduced by 23%, 30%, 7% and 0.7% from April to May,2020. AQI (Air Quality Index) also has been reduced by up to 35%. Same types of cases have been observed all over the world.

Source: Shutterstock

The sky gets more cleared. Harmful agents which are threat to human health declined from their previous concentration level. due to Reduction of air microbiomes, we have observed some rare birds. As there are no appearances of humans the roaming site for birds have got wider. And the food chain of these species has been changed and the change is also noticeable in urban regions also. There must be some changes in reproduction process also. All of these make a new biodiversity system.

Another essential particle to our environment is soil. The landmass we are using regularly, creating pressure over it and the destruction is being caused by our own hands got a temporary relief. There were no vehicles, industrial wastages, agricultural

wastes, no constructions and many more. once in a while corona seems to be as a blessing to the lands. But is it really a blessing? We will advocate it later. During this lockdown situation there were less amount of waste materials. As a result, some micro-organisms reappear. Important bacteria for soils get revived. Because there was less amount of toxic chemicals, no farming agents needed to be used to kill them. Many small plants grew once again. And all of them together make their own biological diversity.

All the elements aforementioned are necessary to make a sustainable environment. But is the atmosphere in our favor? The answer is No. It is a matter of regret that when we want to find the origin of this answer, we found the deadly weapon called Green House Gas (GHG) which is responsible for climate change. And who is the destructive creator? the answer awfully indicates to the human beings.

It is a burning question in today's world. We can't be dictator to the nature. Because nature is controlling all the elements which are related to it. So, this time it pushes us back by the outbreak of deadly disease like covid-19. Now we are in an undeclared cage and the nature is in its own freedom. Carbon dioxide which is the main agent to GHG gets reduced from its previous years as all sources are closed for an uncertain period. Its emission from fossils and

industry is expected to drop 7% in 2020. Leading countries in this regard observed a remarkable drop from previous years. In the USA the percentage is 12%, in EU 11%, 9% in India and 17% in China. The peak of emission decreased this year occurred ON the first of April. Particularly in Europe and the USA the emission decreased by 17%. For this change there are diversities in the liveli-

hood of animals. Greenery is revived.

We found many wild creatures in the urban areas. Chirping of birds are soothing our ears and the environ our eyes. New balanced change is noticeable.

Other reduction of pollutions like noise pollutions, ecological imbalance which has direct or indirect impact over biodiversity contributes to regain the beauty of nature. But we have already declared that every action has its opposite reaction. Is this pandemic really a blessing to environ? Let's have a look over the opposite surface of the coin and advocate it from a different viewing angle.

In medical field we are trying to prevent this demon with our best equipment. But these are now becoming the matter of worry. The materials we are using are made of plastic and they can't be recycled. We are dumping these kits not in a certain place. They are not properly disinfected. So, they are polluting soils and waters.

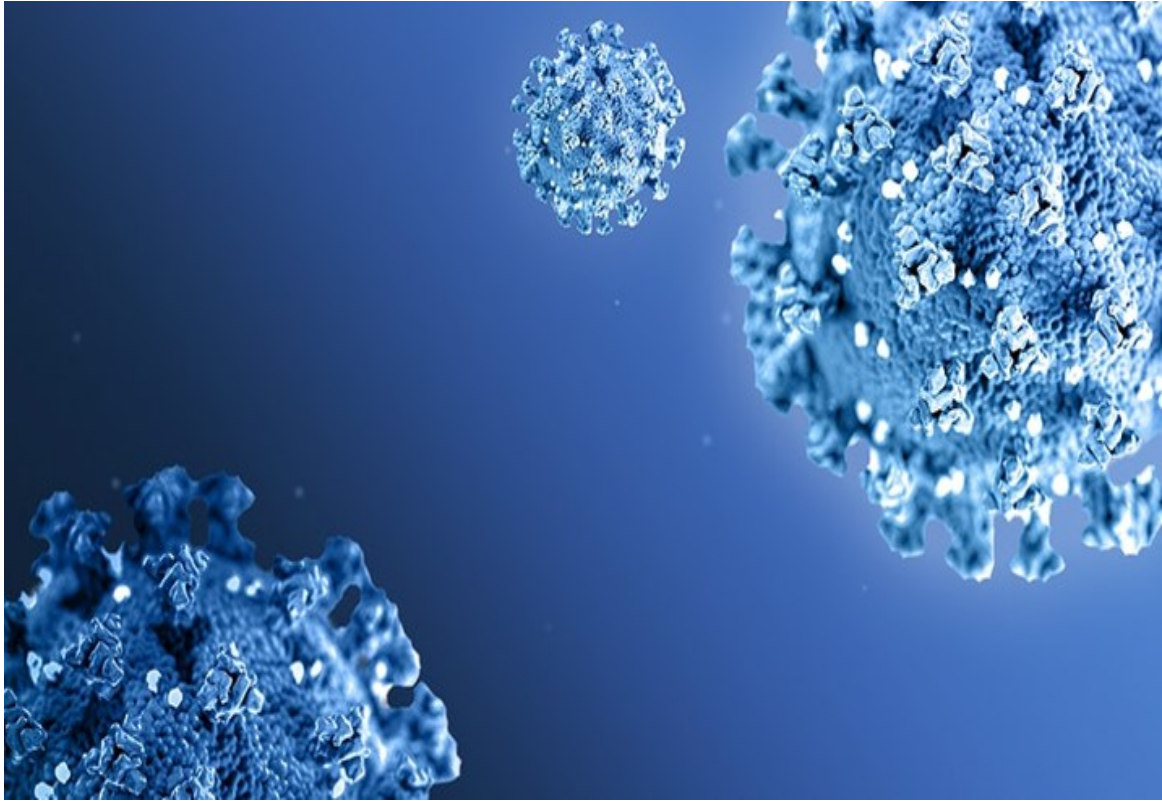
As they are not properly disinfected, they can be source for transmission by air or other mediums. The toxic actions are destroying many important micro-organisms of soil. This toxic or heavy metals are entering the food chain of humans. It causes many deadly diseases. They are also impacting the terrestrial and aquatic biodiversity and their food chain. It can destroy the ecological sustainability.

At a first look we can seem that pandemic is creating benefits to wild creatures. But it is not right. For example, deer is an animal which is much comfortable to stay in a small zone without any kind of risk. But as the humans are remaining isolated in their houses the wandering site for this creature is widen and it is a great opportunity for the hunters.

The case is same for many other animals. In this period tourist spots are closed as a result, animals which are depended on the human foods getting hungry and aggressive. Many wild creatures are attacking the living regions of humans. Many street animals of urban sites are showing the same types of behavior. An imbalanced situation is noticeable.

The pandemic is not only infecting humans but also the wild creatures. Many cases are found all over the world. Three lions and four tigers in Bronx zoo of New York got infected with covid-19. Recently eight lions got this disease in Hyderabad. That means the wild creatures are also in danger.

Every creature of this world has its own contribution to environment. For a balanced ecosystem human contribution is needed. In this regard not only the physical health but also the mental health should be in a sound situation. But as the lockdown has started and is getting longer patience from humans gets disappeared. Many mantel issues are being faced by them. 4 out of 10 adults in US are feeling anxiety or depression. Other mental issues are also noticeable. The cases are increasing all over the world. Many suicidal cases are filed.



But recently the lockdown is getting eased and the movements of humans are increasing the risk of transmission in an alarming rate. Many people are not aware of precautionary steps or disagreeing to follow the rules. Mainly the developing countries are facing the problem. The outbreak can be massive. This also affects the ecology. Recent images of India shocked the world. All religious rituals in funeral can impact the atmosphere of this region. It can be also for the people of other religions.

We can't judge anything from one prospective. We are observing in this lockdown the decline of Green House Gases, less air pollution, less water pollution, less amount of soil pollution. And all of these are impacting the environment with a positive vibe. But a regular process which is continuing from previous years to years in the presence of human is being hampered and there are many changes in wild cycle. These changes shouldn't be occurred. Pollution is decreased. But are previous wastages recycled or waste management laws are strictly applied?

In the same time medical wastages are increasing and they are adding an extra load to the previous scenario. These are threats to the soil. Infected equipment which is dumped into local areas can be a reason for another transmission wave. In Dhaka many industrial sites are closed but the pharmaceutical industries are opened and they are dumping wastages to Buriganga. There is an increase in use of chemicals in medical field during this pandemic.

Chemicals from these factories are contaminating water. So, the aquatic biodiversity is destroying. All of these pharmaceutical toxics are entering the food chain of animals as well as humans. Attitude of wild animals are changed and they can be threat to human beings. Pets like dogs and cats are also being infected and, there should be doctors for them. But when we look at the developing countries, there are many street animals and they can appear as a threat. So, there is a reduction but an imbalance is running in parallel. Temporary relief can't be the solution. We have to think about the long run or else the blessing is going to be turned to curse.

This is all about the negative and positive impacts of covid to biodiversity and to make awareness among people. Ecology is a single word but the meaning is massive. It includes many things.

For a sustainable life ecological balance should be maintained. In recent times we are facing a critical situation and it can be recovered. But the ecology will be with us, so its balance should be maintained. We have to fight against this demon with courage and all precautionary steps have to be followed. Social awareness is a great weapon in this regard. At last, stay home, stay safe and sound.

"In recent times we are facing a critical situation and it can be recovered. For a sustainable life ecological balance should be maintained. "

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Comparison and Reference of Water Pollution Prevention and Control Legal Systems between China and Bangladesh

MD ZIAUL ISLAM

Abstract

Water pollution problem fledges its wings around the world and China and Bangladesh is also not its outreach. This paper aimed to analyze the key water legal issues faced by China and Bangladesh, as well as the institutional and regulatory arrangements in place to address these challenges. This included approaches to water resources allocation and management, pollution control and water use efficiency. The study revealed that the water sources of Bangladesh particularly inland waters are polluted by municipal and industrial sources through a combination of wastewater which is considered as the main reason for water pollution. The study also found that various waste water treatment methods are being explored by industries and various treatment plants, untreated waste water is still being discharged into the water bodies by some industries which accelerate the water pollution both in China and Bangladesh. Thus, effective environmental protection policies compliance drive will bring immense benefit to the environment. Factoring these environmental protection policies into the goals and objectives of various actors involved in environmental deterioration will help policies performance. This will serve as a step forward in the direction of ameliorating water pollution. In China, government has taken rigid steps along with provincial governments to reduce the water pollution. Although still there are inconsistency between different departments regarding enforcing the laws. In Bangladesh, the situation of water pollution is getting worsened day by day due to ineffective function of the existing regula-

China's water pollution mire; Source: The Diplomat

tory approaches to control inland water pollution. Despite, numerous laws and policies, the velocity of water pollution is out of control. Therefore, the aims of the paper were to find out the legal systems of China and Bangladesh that have been using to prevent and control water pollution.

Keywords: legislations, water pollution, industrious effluents, water management, water pollutants

Introduction

Now a days, water pollution has become a serious problem for every corner of the world. This problem has become more acute in developing countries. China and Bangladesh two densely populated Asian countries are burdened with severe water pollution problem since past years. Bangladesh is a riverine country and owns 310 rivers. Despite having a large number of water sources, Bangladesh feels water scarcity crisis due to growing water pollution. Though water pollution is seen in both urban and rural areas but, urban areas where various industries are built-up are the main reasons for water pollution. Being agricultural country, water pollution is causing owing to excessive use of fertilizers and pesticides in agricultural fields that sweep into the water bodies. However, to address these growing problems, Bangladesh Government has attempted to implement a legislative and institutional system and enacts various types of environmental laws and regulations to combat environmental pollution. Throughout China's history water has always been an essential part of political and economic life and important to the country's prosperity and stability. Containing more than 1500 rivers China is also facing water pollution problem through the decades.

With the rapid economic development after the reform and opening up in China beginning in the early 1970s, environmental pollution problems became prominent. The rapid economic growth has created great challenges to water resource management, owing to growing demand for water and a scarcity of available resources, coupled with severe water pollution and other water-related

environmental concerns. However, China has started adopting environmental legislation to minimize the water pollution and protect water resources across the country. But there are still some insufficiencies and lacking to strictly enforce these laws both in China and Bangladesh. Therefore, updating the existing laws and effectively applying environmental laws can help from degrading environment and water pollution for present and future generation.

Water pollution by industries; Source: Environmental Justice Atlas

Significance

Water pollution in Bangladesh is amplified by population growth, poverty, urbanization, industrialization, poor sanitation, excessive use of pesticides and fertilizers in agriculture, inefficient solid waste management and lack of consciousness. Legislation directly or indirectly related to protection of water pollution is present in Bangladesh. After the independence of newly born country Bangladesh, a number of government agencies, Non-Government Agencies (NGOs) and other private organizations either emerged or engaged in water development projects in Bangladesh. Currently, 13 different ministries along with 35 government organizations have been identified which are entrusted with the task of developing Water Resources Management in Bangladesh. Many legislative enactments have been made to address environmental concerns. Water Pollution Control Ordinance 1973 was the first legislation in Bangladesh about water pollution. Then in 1977, Environment Pollution Control Ordinance was declared. In 1992 another Environmental Policy was declared and the Government of Bangladesh has additionally organized various supplementary arrangements such as the Forest Policy (1994), the Fisheries Policy (1998), the Water Policy (1998), the New Agriculture Extension Policy (1995), the Energy Policy (1995).

China's economic prosperity mainly lies in effective management of water resources. In the past 50 years, China has made significant investments in water management and infrastructure, which has led to significant achievements in water supply, irrigation, flood control and hydropower generation. Despite significant investments in water management and infrastructure, more tangible innovative policies and incentives are required to

strengthen and better integrate water management at both national and regional levels. However, the country is still facing acute challenges with respect to both water quantity and quality. China has implemented a series of reforms and pilots in recent years. These have been designed to address the many water-related challenges, including water scarcity, water pollution, ecological degradation, and increased risks and impacts of floods and droughts. The strictest water resources management system established three major control objectives, known as the Three Red Lines, and the construction of an "ecological civilization" has become one of the government's highest policy priorities. As like Bangladesh, China itself also has faced different problems such as enacting and implementing legislations, interconflicts between the ministries to prevent water pollution.

China and Bangladesh may interchangeably help each other with their legal experiences in prevention of water pollution in some extent. In facing environmental challenges, the Chinese experiences will make important contributions to the global discourse especially for the developing country Bangladesh for instance. Since the 1980s, when China implemented reform and an open policy to the outside world, the country has made significant progress in developing and allocating water resources, and in conservation, and protection.

This has contributed greatly to social and economic development and people's well-being. A joint study held between the World Bank and the Development Research Center (DRC) of China's State Council in 2018 stated that "The Chinese experience in managing the development of water resources also has important lessons for other transitioning economies and informing efforts to address global risks to economic progress, poverty eradication, peace and security, and sustainable development." [1]

China has seen its success in preventing environmental pollution in large extent though it has to be effectively worked to sustain preventive measures pollution particularly water pollution. Bangladesh, in this case can get legislative experience from China since water pollution is a major concern there. Simultaneously, China also may obtain information from Bangladesh and imply its own regions. Amid of the growing global awareness of environmental issues; Bangladesh 's commitment to preservation of the environment and the achievement of sustainable development has been quietly strengthened.

Methodology

This study examined the law and practices as regards water pollution in China and Bangladesh and pointed out the defects and deficiencies of the legal systems and practices, and also put forward some specific suggestions from the perspective of China and Bangladesh. The study is a secondary evaluation of existing environmental laws regulating water pollution in China and Bangladesh. The secondary literature and instrument, statutory and case law, relevant public records, text books, administrative and public records, magazines and policy papers, available statistical data, reports of various NGOs, government reports, opinion of experts were reviewed and incorporated to complete the study.
The comparison of the legal systems of water pollution prevention and control between China and Bangladesh

Despite proper guidelines mentioned in the Water Pollution Prevention and Control Law, industrial pollution and its discharges are polluting water bodies heavily. More than 80% of sewage is directly discharged into waters without treatment, more than one-third of China's rivers have been polluted, more than 90% of urban waters are seriously polluted, and nearly 50% of key towns' wa-

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River water pollution challenges; Source: Energy Bangla

ter sources do not meet drinking water standards. [2] According to the "Water Pollution Prevention and Control Action Plan" that was issued in 2015, water treatment will extend from “point source pollution” at the terminal level such as sewage treatment and interception pipe networks to “non -point source pollution” in the whole process of source control, process interruption and end treatment, involving treatment, restoration, and ecological landscape. In 2017, detailed rules for various sub-fields of water treatment were gradually introduced, and specific requirements were put forward for sub-fields such as sewage treatment, black and smelly water treatment, and sponge city construction. [3] It is required to strengthen the protection and prevention of rivers and lakes, protect water resources, protect water environment, water ecology, and water landscape. Though China is using its all level of efforts to make water sources safe from being polluted but still there are unsystematic, uninformative and impractical management are seen for water resources protection.

In order to ensure the protection of inland water, conservation and management of inland water resources as well as promulgated effective laws are significantly interlinked and essential in Bangladesh. The objectives of Bangladesh Environment Conservation (ECA) Act, 1995 which was amended in 2010 are conservation, improvement of quality standards, and control through mitigation of pollution of the environment. The Environment Conservation Rules (ECR) 1997 described the declaration of ecologically critical area, procedure for issuing environmental clearance certificate, pollution under control certificate, determination of environmental standards, application relating to pollution or degradation of environment, procedure for hearing of appeal, various services and their fees etc. It sets the Environmental Quality Standards (EQS) to control quality of air, water, noise, emissions and discharge. The 1997 Environmental Conservation Rules specified waste discharge quality standards for all industrial units and projects. To minimize industrious effluents, the National Water Policy 1999 of Bangladesh, Environment Conservation Act 1995, Environment Conservation Rules 1997 have highlighted the effluent discharge problem as a critical water management issue, and has set broad guidelines to prevent water pollution

caused by industries.

The Water Rule 2018 has performed a wide range of functions namely compliance orders, protection orders, removal orders, imprisonment and fines/ compensation, the maximum amount of surface water or groundwater that can be withdrawn by individuals or organizations, clearance certificate by Executive Committee in terms of water related projects. However, in the Bangladesh Water Act 2013, there are no provisions found for punishment related to industrial discharges, establishing discharge standards and also for the establishment of ETPs. Additionally, there are no guidelines relating to non-point water pollution sources like fertilizer and pesticides.

Discussion

Considering the above points have discussed earlier, it can be recommended that the following measures may help to reduce the water pollution and to protect water resources for further pollution. It needs to be ensured the effective and functional role of water resources protection and monitoring system. It needs to be effectively solved the problem of water pollution disputes on admin-

China to **quick** steps of prevention, control of water pollution; Source: China Daily

"It needs to be ensured the effective and functional role of water resources protection and monitoring system. It needs to be effectively solved the problem of water pollution disputes on administrative boundaries, and preside over the preparation of national water quality standards and protection regulations for water sources"

istrative boundaries, and preside over the preparation of national water quality standards and protection regulations for water sources. It requires to analyze and calculate the allowable discharge of pollutants in the main water function areas, formulate a control strategy for the total volume of pollutants in the basin, and establish an optimization model for the construction of pollutant reduction and water quality improvement projects in the basin.

It is also recommended to establish a river basin water resources protection and supervision system with drinking water source functional areas as the core, and study and formulate national water quality standards and protection norms for water supply source areas. Additionally, it is suggested that based on the water function zoning, establish a national water quality monitoring and control system for the main control sections of rivers and lakes, timely forecast the water quality change process of the main rivers and lakes in the country (though already it has been introduced but need further improvements), and analyze and evaluate the compliance status of the water function areas.

Conclusion

The environmental laws and rules for preventing and controlling water resources from being polluted in different ways in China and Bangladesh were used insufficiently in the primary stage. Both the governments have proposed the key initiatives and measures to reduce water pollution as it affects the ecosystem and other living beings who are directly or indirectly depended on water. It is noticeable that there has been lacking of proper, effective and timely enforcement of the laws on preventing and controlling water pollution that is required to design a comprehensive legal framework and devise measures of the implementation of such laws.

It is; however, China has significantly improved its legal systems and policies regarding to water pollution. Bangladesh, on the other hand, is also improving its laws and policies to abate the water pollution. For Bangladesh, the declaration of the National Water policy is a bold step towards good governance. It is believed that this policy may reimburse the damages that have already been done to the bio-diversity and environment of the country. Since both the countries rapidly are moving to industrialization; therefore, severe water resource management challenges like water scarcity, water pollution, and industrial pollution will increase unless more effective policies are properly implemented. To meet the water resource management challenges; holistic, integrated, scientific approach with effective water prevention and control laws and policies are highly required.

"In China, government has taken rigid steps along with provincial governments to reduce the water pollution. Although still there are inconsistency between different departments regarding enforcing the laws. In Bangladesh, the situation of water pollution is getting worsened day by day due to ineffective function of the existing regulatory approaches to control inland water pollution."

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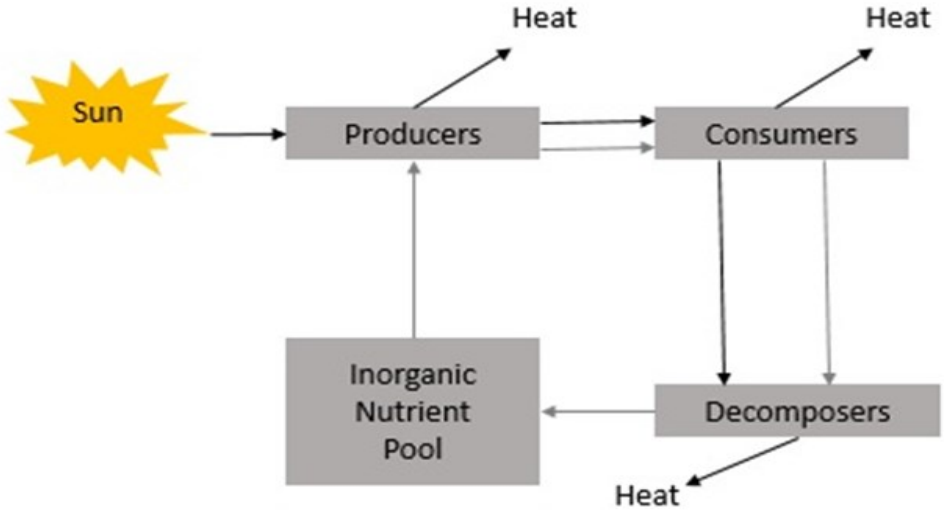
Let's Talk About the Chain of Nature

Najifa Alam Torsa

Billions of years ago, our earth was just a mere orb made from the remnant of the Sun. Over time it cooled down and started becoming a green planet gradually. When the planet was growing slowly and the environment was getting cooler, the links of life cycle started to constitute. And when we say The Links, we mean the interactions between the elements of the environment. These interactions are called the Ecosystem. For millions of year human kind has been in an interaction with the nature. It's like a negotiation happening for years between them. Different culture, various behavior of every nation or tribe have been built around these ecosystems. Sir Aurthur Tansley, the person who first used the term "Ecosystem", defined ecosystem as "the whole system (in the sense of physics) including not only the organism-complex, but also the whole complex of physical factors forming what we call the environment of the bi-

ome-the habitat factors in the widest sense." The reflection of ecosystem has been seen on those cultures. But as the human kind started growing, they started taking over the nature. Mankind started causing the consumption of natural resources. The Amazon, The Prairies, Coral Reefs etc. are in grave danger because of the destruction in the system. These can be recovered by knowing this chain and by taking a step only. A study from 2021 says that only about 3% of the earth's terrestrial ecosystem is intact which is really alarming. Also the growth in socio-economic aspects and technologies raising head are causing the degradation. Humans also should come forth to patronize what they have lost for their own good.



Energy Flow in Nature; source: Tuorialspoint

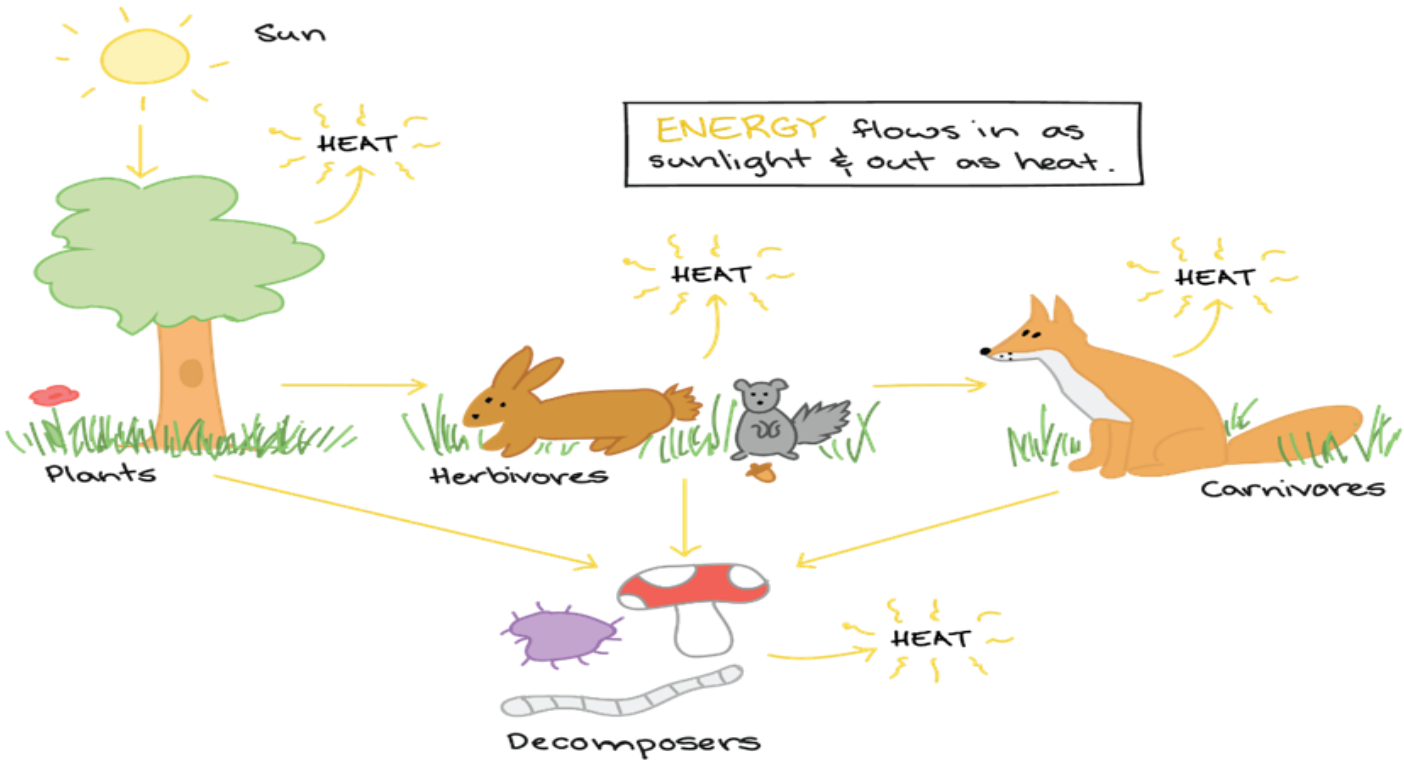
Our environment has both living and non-living components. Both components are equally contributing to the environment to keep its stability. In simple words, ecosystem is the key that has built the environment by keeping the interactions between the living and non-living organisms. The interactions are the vital factors to keep the stability of the environment. Or we can consider ecosystem as a geographic area where plants and animals and every biotic-abiotic element interact with each other and support each-others living. But as there are different types of environment on our planet, the ecosystem process differs from place to place. There is terrestrial ecosystem which includes surface organisms or the oceanic ecosystem including the aquatic lives or grasslands or desserts and so many. All of these ecosystems have different nature with different types of elements.

The ecosystem works on bringing the biotic and abiotic elements altogether by using the sun's energy and making up food chains which is called "Web of Life". The elements are mainly biotic which includes plants, animals and other organisms. And abiotic elements including weather, temperature, rocks etc. The energy from the sun is the powerhouse for the ecosystem to work. This energy enters into the biological system and then turns the biological energy into chemical energy. The plants use the chemical energy or molecules to feed themselves and some of the animals (specially, herbivores) rely on the plants of course. Sometimes the animals take the chemical energy as a whole.

After the energy is consumed by both plants and animals, that energy is used in their biological systems. This process is mainly like a circle and is often ended by bacteria when the plants and animals are dead by decomposing their bodies. After

this decomposition the same energy is thrown off to the environment again. This cycle continues happening in previous direction over and over again. So we can see that it is a chain. A chain on which we are depended and our lives are relying. Ecosystem is a process of balancing each other. When one part of the chain is misplaced the whole chain collapses. That means If by any chance, one element becomes dominant, the whole system will become imbalanced. For example, in forest ecosystem if one carnivore is dead, then too many herbivores will grow. As a result of too many herbivores in a forest the plants or producers will start depleting. For this reason, there will be less producers and after a while the herbivores will start starving in large number. Thus the system will break down soon and the entire arena will be affected. So, if the balancing is not happening properly, then the whole system will collapse. That is why keeping stability of the balance is crucial.

There is a saying that nature can heal by itself. Yes, this is very much true. But after destroying the whole balance of the nature mother, this saying is a bit harder to be occurred. Human activities has caused destruction to around 1.9 million square kilometers undisturbed ecosystem in the years between 2000-2013. About 58.4% of Earth's ecosystem has been in under risk because of human activities. According to "The Living Planet Report 2020" in last 50 years around 68% of wildlife population has fallen down. All these annihilations can't be fixed only by nature itself. Also according the Global Assessment Report on Biodiversity and Ecosystem Services 2019, about one million species of plants and animals faces extinction because of human activities.



Chain of Nature; Source: Khan academy

So, what can be the solution for all these? What is the one thing that should be implemented to cover up these destructions?

The UNEP have pronounced "Ecosystem Restoration" as the theme for World Environmental Day 2021. Because only restoring of the ecosystem can restore our earth. Restoring the ecosystem means supporting the nature to heal by itself. Ecosystem

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Human activities Destroying the nature of chain; Source: Biology portfolio

restoration means recovery of the destroyed nature. Restoration can be done in many ways. Such as by planting more and more trees, reducing different types of pollution, using biodegradable materials in day to day life, reducing plastics use on daily basis, decreasing the extraction of natural resources, cutting off the toxic habit of daubing the surroundings, cleaning up the rivers and resources etc.

Planting tree for sustainable ecosystem; source: Blendspace

Even governments can recognize ecosystem rights in their own countries just like the government of Ecuador did where the rights of Nature states that mother nature where all these started has the right to exist, to flourish, to persists and to regenerate. As science and technologies are growing swiftly, the need for using the newest inventions to restore the earth are getting important. We should use science to save the earth not to destroy it. Our generation is facing both the blessings and destructive looks of sciences. So only this generation can take a leap ahead to make a difference. This is our duty to make a move so the mother nature can smile again. Restoring the chain of life can help restoring our earth. And by restoring our earth we can build a better earth for the next generation.

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Air pollution: The invisible killer and Preventive Measure to control it

Layla Mostari

: Air pollution control; Source: Encyclopedia Britannica

Millions of people die prematurely every year from diseases and caused by air pollution. Air pollution is the mixture of substances in the atmosphere that are harmful to humans and other living beings, or causes damage to the climate or other materials. It is also a mixture of solid particles and gases in the air. Car emission, chemicals from factories, dust, pollen and mold spores may be suspended as particles. Ozone is the major part of air pollution in cities. Some air pollutants are poisonous. Inhaling them can increase the chance you'll have health problems. People with heart or lung disease, older adults and children are at a greater risk from air pollution. Air pollution has become the biggest cause of premature death, overtaking poor sanitation and a lack of clean drinking water. According to the WHO, more than 3.5 million people are being killed each year

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by the air that they breathe in urban areas, and the number is rising. Air pollution now kills twice as many people as HIV/AIDS. That's the stark message from the latest OECD report, The Cost of Air Pollution: Health Impacts of Road Transport.

Air pollution from various sources

Air pollution varies greatly in different parts of the world. But what about the primary weapons against it? To find answers, researchers from McGill University set out to investigate global air quality standards in a study published in the Bulletin of the World Health Organization. The researchers focused on air pollution called PM2.5 -- responsible for an estimated 4.2 million premature deaths every year globally. This includes over a million deaths in China, over half a million in India, almost 200,000 in Europe, and over 50,000 in the United States. "In Canada, about 5,900 people die every year from air pollution, according to estimates from Health Canada. Air pollution kills almost as many Canadians every three years as COVID-19 killed to date," says co-author Parisa Ariya, a Professor in the Department of Chemistry at McGill University.

The most common question is," where does Air Pollution come from?" And that time we can find the different sources of air pollution. The number one source of outdoor air pollution is the burning of fossil fuels, primarily by motor vehicles. However, manufacturing industries, mining, and coal- and gas fired power stations are also responsible for polluting the atmosphere. The exhaust from manufacturing factories usually includes particulates and gases such as oxides of nitrogen and Sulphur, sometimes carbon monoxide, and a range of organic compounds, some of which are cancer causing. In countries such as Australia, a lot of work has been done to regulate, license and control industrial emission. However, there are some important sources of pollution that are presently unregulated including, for example, off-road diesel engines and ships. Air pollution in our environment will undoubtedly affect our quality of life and it can also cause various health problems and other negative effects.

Some Environmental and health impacts of air pollution are as following:

One of our era's greatest scourges is air pollution, on account not only of its impact on climate change but also its impact on public and individual health due to increasing morbidity and mortali-

ty. There are many pollutants that are major factors in disease in humans. Among them, Particulate matter (PM), particles of variable but very small diameter, penetrate the respiratory system via inhalation, causing respiratory and cardiovascular diseases, reproductive and central nervous system dysfunctions, and cancer. The health effects of air pollution are serious- one third of death from stroke, lung cancer and heart disease are due to air pollution. Short term exposure to air pollutants is closely related to COPD (Chronic Obstructive Pulmonary Disease), cough, shortness of breath, wheezing, asthma, respiratory disease, and high rates of hospitalization. The long-term effects associated with air pollution are chronic asthma, pulmonary insufficiency, cardiovascular mortality. This is having an equivalent effect to that of smoking tobacco, and much higher than, say, the effects of eating too much salt. And air pollution has also many impacts on environment. Air pollution can damage crops and trees in a variety of ways. Ground-level ozone can lead to reductions in agricultural crop and commercial forest yields, reduce growth and survivability of trees seedings, and increased plant susceptibility to disease, pests and other environmental stresses.

Besides this air pollution have following impacts on environment:

- Global Warming.
- Climate Change.
- Acid Rain.
- Smog Effect.
- Deterioration of fields.
- Extinction of animal species.
- Respiratory health problems.
- Deterioration in building materials.
- Chemical Sensitivity.
- Skin Damage.

So, from the above discussion we can see that air

Air pollution in city areas; Sources: NDTV

pollution has adverse impact on both environment and human health. So, it is necessary to take preventive measure to control air pollution.

Air pollution control systems; Source: KCH services Inc.

And as a result, we want to find way out. Three simple solution to reduce air pollution such as reducing the using of vehicles, cutting down the using of machineries and planting trees.

The first necessary way to solve this problem is to cutting down the using of machineries. We should try to use more human labor rather than machines in production or farming activities. For instance, people in our country can use handy craft products and do their farm by the human being like doing farm in a traditional way without using any kinds of tractors. Furthermore, for the products which are made by machines, such as paper, bottles, cans, or plastic bags, we should re-use and recycle them as possible as we can instead of producing more products.

The second way to solve this problem is to reduce the using of vehicles. People should change from travel by their own car or motorbike to travel by public transportation such as taxies, buses, or trains. When we can cut down the number of cars or motorbikes on the street, the amount of CO2 also decreases and we can save our air.

The third way we have to do is planting trees. Trees convert carbon dioxide into oxygen, cleaning up air pollution every day, so we have to reduce cutting down of it. According to McPherson (2003), "leaves of trees absorb or intercept air pollutants, including small particulate matter and the component of smog." In addition, the trees help cooling neighborhoods to create less need for air conditioning.

As air pollution is a great problem and it causes harm to both human and environment. So, it harms to our surrounding like invisible killer. That's why the above control measure is necessary which will help reduce this big issue to our environment. In conclusion, we must work together to reduce air pollution so that our future generation can lead in a healthy, unpolluted environment.

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source: iwithness news

Ecosystem-Based DRR for Sustainable Development

Touhidur Rahman Tuhin
Nazmunnaher Nipa

An ecosystem is a place where living and non-living organisms can interact with each other. It's a dynamic complex of plants, animals and other living communities and their non-living environment interacting as functional units. Healthy ecosystems are comprised of interacting and often diverse plant, animal and other species, and along with this species and underlying genetic diversity, constitute the broader array of biodiversity. Biodiversity is the combination of life- forms and their interactions with one another, and with the physical environment, which has made Earth habitable for people. Ecosystems provide the necessities of life, offer protection from natural disasters and disease and are the foundation for human

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culture.

Ecosystems, such as wetlands, forests, and coastal systems, can provide cost-effective natural buffers against hazard events and the impacts of climate change. Human well-being depends on ecosystems that also enable people to withstand, cope with, and recover from disasters. There is a two-way relationship between poverty and disasters, with poor communities being subject to a greater number of disasters, especially in areas where ecosystems are degrading. Ecosystem degradation, especially of forests and peatlands, reduces the ability of natural systems to sequester carbon, increasing the incidence and impact of climate change, and climate change-related disasters.

Nature After disaster; source: the conservation

Ecosystem degradation is undermining this link due to several human activities, mainly- land use and land cover changes, or changes to habitats due to conversion to croplands and urbanization; over-exploitation of resources or higher demand for ecosystem goods than can be sustained, such as overfishing; climate change impacts are affecting ecosystems and exacerbating environmental degradation; invasive alien species are introduced species that compete and encroach vigorously upon native species, with the potential to degrade ecosystem services and cause severe economic damage; pollution, from chemical waste and agricultural inputs, has severely degraded many ecosystem services, and continues to act as a major driver of change.

Healthy ecosystems both reduce vulnerability to hazards by supporting livelihoods while acting as physical buffers to reduce the impact of hazard events. This "natural infrastructure" is in many cases equally effective in reducing the effect of the hazardous incident, and is often less expensive than human-built infrastructure. Disasters also hamper development goals, and yet few governments, donors and development organizations adopt a precautionary approach in the design and management of projects, and fewer still recognize the role and value of ecosystem management for reducing disaster risk.

Healthy and diverse ecosystems are more resilient to extreme weather events. Intact ecosystems are less likely to be affected by, and more likely to recover from the impacts of extreme events. However, disasters can affect ecosystems through habitat loss and species mortality. Poorly designed post-disaster clean-up efforts can also negatively impact ecosystems, with negative consequences on progress toward achieving the objectives of the UN Convention on Biological Diversity and Millennium Development Goals.

Ecosystem-based disaster management refers to

decision-making activities that are taken into consideration current and future human livelihood needs and biophysical requirements of ecosystems, and recognize the role of ecosystems in supporting communities to prepare for, cope with, and recover from disaster situations. Sustainable ecosystem management is based on equitable stakeholder involvement in land management decisions, land-use trade-offs and long-term goal setting. These are central elements to reducing underlying risk factors for disasters and climate change impacts. Ecosystem-based DRR for sustainable development includes- Ecosystem management, disaster risk management, planning, adaptation/mitigation of climate change etc.
Some valuable Steps for integrating management with disaster risk reduction:

In the Pre-disaster, Prevention, mitigation and preparedness stages should ensure that proper environmental practices are followed that value and restore ecosystems, especially wetlands, coastal ecosystems and forests on steep slopes as natural buffers. Specific projects may include wetland restoration, tree planting, and restoring coastal open spaces.
In the Post-disaster, Response, recovery and rebuilding stages progress from quick relief to save lives too short and medium-term planning of housing and livelihood solutions. Principle environmental concerns must have integrated into each of these stages, following the goal of "reducing the underlying risk factors".
Core environmental considerations can be included in contingency plans and standard disaster response procedures to avoid the potential damage that can be incurred and impede long-term recovery. Mostly included pollution minimization, effective waste management, Rehabilitate damaged ecosystems with native species when suitable and prevent the spread of invasive alien species, particular provisions should be made for women, children and others. Rapid Environmental Assessments are useful to assess the environmental situation post-disaster in a quick and low-cost manner for more effective immediate and long-term recovery planning.

Management of watershed; Source: indiawaterportal.org

Watershed management:

Watershed management is necessary for agricultural, environmental and socio-economic development. The physical and biological resources of watersheds provide goods and services to people including water protection, attenuation of disasters

by regulating runoff, protection of coastal re-

Forest management; source: sutterstock

sources and fisheries, protection of the environment and protection of productive lowlands. Watershed management programs need to build on existing environmental initiatives.

Forest management

It is required to balance the demand for forest products with the ecological requirements of forests, while ensuring other Core benefits for livelihoods, notably by stabilizing steep slopes and reducing soil erosion. Although listed separately here, forest management has often integrated into watershed management. - Protect and improve the forest environment through increased vegetation.

Coastal zone management

Replant coastal forests and restore mangroves, which have taken up as a part of the environmental recovery process; - Restore and maintain the health of the coral reefs and seagrass beds, through reducing pressure from pollution, overfishing, sedimentation, etc.; - Maintain and/or develop mangrove belts as buffer zones for coasts and coral reefs; - Protect wetlands and watersheds to minimize sedimentation. Threats to ecosystems are monitored- Soil erosion, overuse of fertilizers, desertification, industrial logging, fragmentation of habitats, slash and burn agriculture, conversion of ecosystems for urbanization and agriculture, climate change impacts etc.

Need to ensure that land-use planning is not damaging to ecosystems and human well-being. Ensure that existing legislation is following and enforced, especially related to zoning and land-use planning. For example, con-

cern coastal buffer zones and proper road-building in mountainous areas to avoid landslides. Disaster risk reduction planning should include coordination with environmental ministries, in addition to disaster management and land use planning authorities.

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Brick kilns nearby Agricultural Areas how much Impact on Agricultural lands, Human health and The Environment

Happy Khatun

Bangladesh ranks fourth in the world in brick production. Brick kilns are a major cause of environmental pollution and health risks. Bricks is a significant part in a construction material. In Bangladesh, set up about 8,000 brick fields without any clear environmental guidelines (The Financial Express, 2013). Usually brick fields or brick kiln in Bangladesh are situated in open field areas, and those are near by the agricultural areas. Otherwise the brick fields are situated in the town and major construction sites. But according to the brick kiln control

Brick kiln in Haor area, Sources; Tuhin

(amended) Act-2001, "there must be no establishment of brick kilns within a three-kilometer radius of human in habilitation or reserved forest" (The Daily Star, 2014).

In our country, we know that, 8,000 brick fields situated and every day burning the huge amount of wood to produce the brick. And also produces the countless amount of black smog. Black smoke are the dangerous for the environment. Most brick kilns low energy efficiency and that are highly polluting the environment. The weak financial situation of most kiln operators hinders the adoption of modern technologies and thus affecting arable lands, agricultural productivity and environment negatively.

Black smoke from brick kilns moves away from species which are involved in pollination process, in turn declines agricultural production (Islam and Rahman, 2011). There are more than seven thousand brick kilns in the country. More than 23 billion bricks are being produced in Bangladesh every day. The brick industry contributes about one percent to the GDP. About TK 205 billion a year is being added to GDP from brick factories. More than one million people are working in the country's brick kilns.

Brick kilns in Dhaka city mostly responsible for air pollution. According to the research findings, the brick kilns are causing 58 percent of the air pollution in the Dhaka city. Dust from roads and bare soil causes 18 percent of the pollution, vehicles cause 10 percent, and others sources 14 percent. According to the another research run by the World Bank on technology use in the Bangladesh brick kilns that the kilns caused 38 percent of the air pollution in 2011. Brick kilns are the prime sources of greenhouse gas in the country. Brick kilns are produce an approximately 8.7 million tonnes of greenhouse gas each year that burn 2.2 million tonnes coal and 1.9 million tonnes of firewood. The adverse effect of air pollution on vegetation have been well reviewed in terms of foliar injury, physiological as well as yield characteristics (Singh and Rao, 1981)

Image source: The Daily star

Brick kilns in agricultural lands, low quality wooden fuel in brick kiln, improper fixed chimneys and the violation of laws to conserve environments and hazards sectors into a major cause of agricultural productivity decline, pollution of environments and hazards towards human health (Guttikunda and Khaliquzzaman 2014). Brick kilns are the main source of air pollution. Huge amount of black smoke that effect on the environ-

ment and adversely effect on the human body and damage the agricultural fields. Particulate pollutants and many gaseous emanating from brick kilns negative impact on the coordination vegetation. The toxic smoke from the brick kiln mixes with the human body and environment very quickly.

Brick kilns have the negative impact on the environment, that impacts are divided into the two way, short term and long term impact of the environment. Reducing the crop production, deforestation, hampering normal vegetation are the short term effect and impacts of ozone layer depletion, production of photochemical smog, global warming, reduction in land fertility, etc. (Pokhrel, 2011). One top soil is removed for making the bricks, the brick takes 25 to 30 years for those lands to regain fertility. Brick kilns emissions damage the crops. The brick fields cuts off the soil of the crop land and damages the roads due to its transportation.

The toxic smoke from the brick kiln burns and fades the trees of different species, starting from the crops of the land. The fish in the pond dies, the vegetables, and the land loses its fertility. Public life and livelihood are endangered. A study on the presence of heavy metals in agricultural lands and possible sources of these substances in 2015 stated that presence of heavy metals cadmium and lead in the surrounding brick kilns (Sikder et., 2015). Conventional brick kilns not only pollute the air but also transfer these pollutants from the air to the soil in various atmospheric ways and greatly accelerate the soil pollution, which destroy the balance of essential nutrients in the soils.

Most of the brick kilns in Bangladesh are properly designed, which causes incomplete combustion of coals (Ahmed, 2007). Incomplete combustion produce carbon monoxide (CO), which increases risk for heart disease. If rubber tires are used as fuel then along with carbon monoxide (CO), emissions from brick kilns comprises of fine dust particles, hydrocarbons, sulpher dioxide (SO2), particulate pollutants, oxides of nitrogen (NOx), floride compounds and small amount of carcinogenic dioxins (Joshi and Dudani; WHO, 2013). Mainly brick kilns use wood, recycled motor oil, coal, diesel, rubber tire, trash, and plastics as fuel. The amount of oxygen decreased and the amount of various carbon compounds increases at an alarming rate. This also increases the temperature of the atmosphere. People of all ages, including children, suffer from respiratory problems, eye irritation, headache, skin disease, bronchitis, asthma, and various complex lung diseases, leading to gradual death. The people living far away from the brick kiln are also suffered from health problems. Joshi and Dudani observed that peoples who living near brick kilns are more likely to suffer from illness, comparing those who are living in areas without the brick kilns.

Due to the presence of brickfields around the cultivable land, the amount of crops that used to be produced is decreasing day by day. As a result, the farmers are facing losses. And the farmers fell into financial crisis. This has an impact on public health. Studies show that particulate matter is seriously harmful for both adults and children. Particulate matter is deadly to health. When those contaminants from the brick kiln enter the human body through respirator, the respiratory system is damaged, which lowers the immune system, as a result, the health risks are higher among the people living around the brickyard. So, we need to create awareness about this impact.

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