The Environment *Review*

ISSN: 2708-776x (Print), 2708-7778 (electronic)

Volume 3 Issue 4

October-December, 2022

Water is life

treat it right

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Content

Volume 3, Issue 4
October—December 2022

Publisher:
The Environment Review Society

Place of publication:
Mymensingh, Bangladesh

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Price:
BDT 100.00
USD 2.00

The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

FOR LEGAL PRICE, ITS TIME TO IMPROVE ENVIRONMENTAL CONDITIONS OF TANNERY INDUSTRIES

Estiak Ahmed

Photo by Dom J (Pexels)

Leather is a by-product, the main sources of raw material for the leather industry worldwide are cattle (including buffalo), sheep, goats and pigs, which are reared specifically for the production of meat, wool and/or dairy products. Since the Palaeolithic era, clothing and accessories have been made from animal hides. Everyone has read about the so-called "early man" who hunted wild animals for nourishment and covered himself in their skin.

Large-scale development of Bangladesh's leather industry, one of the country's greatest industries, began in the 1970s. According to the government, one of the key drivers of the nation's growth is "leather goods and footwear." The leather industry in Bangladesh produces leather-based goods such clothing, shoes, belts, bags, coats, luggage, wallets, and a few upscale items. These goods are offered for sale on both domestic and international markets. The leather industry's fastest-growing subsegment is leather footwear. Leather Industry Bangladesh has long been producing leather and leather goods for domestic market and export. Bangladesh has historically exported semi-tanned and raw hides. Exports of leather account for a significant portion of Bangladesh's export profits. The sector earned $1,258.82 million from leather and leather products in the 2013-2014 fiscal year, making it Bangladesh's second-largest export sector. The export revenue for this industry was 1130, 1161, and 1234 million dollars over the following three fiscal years, respectively. But over the past few years, the percentage of this industry's international income has been extremely low. The result of which is having a significant impact on the marginal price of leather. The cost of leather in Bangladesh has drastically decreased as a result of its low pricing on the international market.

Source: PBS

The low cost of Bangladeshi leather on the global market is due to a variety of factors, one of which is the absence of global environmental recognition. Bangladesh is unable to keep leather exports environmentally balanced. Bangladesh's export of leather and leather goods is not acknowledged internationally. Indigenous leather is being denied its rightful worth for this same reason. When it comes to exporting leather and leather goods, Europe is the most lucrative market, but Bangladesh is losing this market due to a lack of worldwide environmental recognition.

Source : The Business Standard

The majority of semi-tanned and tanned hides, leather clothing, and footwear make up around 95% of the raw hides and leather items that are sold. The European nations of Italy, the Netherlands, Germany, France, Spain, Russia, Brazil, Japan, China, Singapore, Taiwan, South Korea, and the United States are major

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Photo by Ekrulila (Pexels)

suppliers of leather and leather goods to Bangladesh. A certificate from the International Standards Body (ISO) and an environmental certification from the Leather Working Group (LWG), another significant organization in Europe, are required for exporting to Europe.

The Leather Working Group (LWG) is crucial to the global leather sector. This nonprofit organization has evaluated leather-related businesses globally since 2005. Their primary goal is to create a sustainable industrial system by guaranteeing that leather products are produced using ecologically friendly methods. The certification from the International Standard Organization (ISO) is extremely crucial in the worldwide leather market. Unfortunately, neither of these two organizations has Bangladesh's certification or recognition. Bangladesh has applied for this recognition certificate since 2017, hence it is not true that it has not made an effort to obtain it. However, the worldwide certification of these two institutions was not possible since the environmental circumstances in the tanneries' production standards are not yet in a good position.

The government of Bangladesh is making a lot of effort to stop environmental degradation brought on by leather industry waste.
To minimize pollution of the Buriganga river and promote industrial compliance, the government constructed Bisik Tannery Industrial Estate in Savar in 2003 on 200 acres of land, and all tanneries were relocated from Hazaribagh to Hemayetpur.

However, compared to the 40,000 cubic meters of liquid waste that tanneries dump each day, the facility has a daily capacity of roughly 25,000 cubic meters. In addition, effective solid waste management has not yet been implemented in the area. But even there, the desired outcomes were not attained. shall be The Central Effluent Treatment Plant (CETP) has been under

construction for 19 years, however it is still not finished. The construction of the solid waste dumping facility or yard has not yet begun. The Development Policy for Leather and Leather Products was created

by the Bangladeshi government in 2019. By expanding the domestic market, increasing the sector's total export revenues to US$ 5 million by 2024, and increasing its current contribution to GDP from 0.5 percent to 1 Promotion in percentage, the policy's main goal was to develop the leather and leather sector as a sustainable, environmentally friendly, and competitive sector. Despite the fact that this policy has been accepted, the tanneries seldom ever see it being put into practice because of the required monitoring mechanism and the uncooperative dealers. As a result, there was no improvement in the Tanzanians' environmental circumstances.

To receive a leather working group certification, a 1365 quality verification process is completed. Bangladesh Cottage Industries Corporation (BCIC) only received 200 of these points. 100 of the marks are through CETP, while the remaining 100 are through the dump. BSIC and tannery proprietors still need to earn the final 1165 marks.

Because no one wants to purchase Bangladeshi leather due to a lack of international environmental clearance, the country's leather and leather goods do not command reasonable prices on the international market. US and European Union (EU) brands do not purchase leather from Bangladesh. China is now Bangladesh's primary customer, yet there are no decent pricing available. Bangladeshi leather and leather products won't receive a fair price on the international market, and it won't be feasible to ascertain the true price of leather in the nation, as long as Bangladesh is unable to meet ecologically friendly international standards in the processing of leather.

To ensure Bangladesh's leather sector grows quickly and sustainably, several critical initiatives can be implemented.

Source: Lynne Buchanan

In order to transform Savar's tanneries into livable, pollution-free, contemporary industrial communities with all the amenities like housing, healthcare, educational facilities, marketplaces, and business and entertainment centers, the government needs carefully carry out its plans and uphold its promise. ensuring employees, workplace health and safety, as well as other facilities, in order to boost output, exports, employment, and GDP contributions.

The Solid Waste Management System should have all modern facilities as these are essential for an eco-friendly leather industry. Action should be taken im-

ISSN: 2708-776X (print), 2708-7778 (electronic)

Photo by Anna Shvets (Pexels)

mediately to complete the water and sewage treatment system in the Leather Industrial Estate. This must include a central dumping yard, a modern CETP system, Sludge Power Generation System (SPGS), Sewage Treatment Plant (STP), Common Chrome Have to Stay Recovery Unit (CCRU), and Solid Waste Management System should have all modern facilities. An internationally renowned and technically capable agency like UNIDO may be asked to keep an eye on CETP operation and future maintenance.

Better work environments, social and environmental conditions, and more vigilance in each tannery toward enhanced solid waste management systems, cleaner technology, greater occupational safety, and worker health protection are all things that Bangladesh Chemical Industries Corporation (BCIC), Bangladesh Tanners Association (BTA) and Bangladesh Finished Leather and Footwear Exporters Association's (BFLFEA) should try to achieve. To ensure that employees have access to efficient healthcare close at hand, a specialized hospital should be built.

The nation's leather industry city must meet worldwide standards in order for the sector to advance. It is not only feasible for the government to completely implement these steps on its own, but also necessary for the affected businessmen to cooperate. Only by putting combined initiatives of the government and businessmen into action will the tannery sector be able to achieve environmental balance. Finally, only when Bangladesh is able to preserve environmental balance in leather exports will Bangladesh's leather and leather products receive a fair price on the global market.

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Photo by Kevin Menajang (pexels)

The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

Challenges in Safe Water:

Phytoremediation of Ground Water and Wastewater Treatment

Nadira Islam

Water is one of the most magical things on the planet and the driving force behind all of nature. At least 2 billion people worldwide drink contaminated water and it can spread diseases such as diarrhea, cholera, dysentery, typhoid, and polio. Each year, it is estimated that contaminated drinking water causes 485,000 diarrhoeal deaths. In 2017, 71% of the global population (5.3 billion people) drank from a safely managed drinking-water service, which was on-site, available when needed, and free of contamination. 90% of the world's population (6.8 billion people) used some form of basic service. A basic service is an improved drinking water source within a round trip of 30 minutes to collect water. Climate change, increasing water scarcity, population growth, demographic changes, and urbanization already pose challenges for water supply systems. By 2025, half of the world's population will be living in water-stressed areas. Re-use of wastewater, to recover water, nutrients, or energy, is becoming an important strategy. Increasingly countries are using wastewater for irrigation – in developing countries, this represents 7% of irrigated land. While this practice if done inappropriately poses health risks, safe management of wastewater can yield multiple benefits, including increased food production. 785 million people lack even a basic drinking-water service, including 144 million people who are dependent on surface water.

One of the burning problems of our industrial society is the high consumption of water and the high demand for clean drinking water. Groundwater is used for domestic, and industrial water supply and irrigation all over the world. Options for water sources used for drinking water and irrigation will continue to evolve,

Source: International Institute for Sustainable Development

with an increasing reliance on groundwater and alternative sources, including wastewater. Although three-fourths of the earth is surrounded by sea only a little portion of it can be used for drinking purposes. The use of aquatic plants for water and wastewater treatment is increasing nowadays. The project aims to examine the phytoremediation potential of water hyacinth. Many researchers have used different plant species like water hyacinth, and water lettuce for the treatment of water.

In arid and semi-arid regions, where well-managed water transportation systems and related infrastructures are not available, groundwater serves as the chief source of drinking water. Groundwater is influenced by many factors, including the composition of precipitation, mineralogy of the aquifers, climate, topography, and anthropogenic activities. According to the United States Environmental Protection Agency (USEPA, 1993), groundwater becomes contaminated naturally or because of numerous types of human activities like residential, municipal, industrial and agricultural. In recent days, groundwater quality is decreasing day by day due to rapid urbanization and fast industrial growth. Unrestricted exploration of groundwater and excessive use of fertilizers and pesticides make possible the infiltration of detrimental constituents into the groundwater.

Phytoremediation uses plants to clean up contaminated soil and groundwater, taking advantage of plants' natural abilities to take up, accumulate, and/or degrade constituents of their soil and water environments. Results of research and development into phytoremediation processes and techniques report it to apply to a broad range of contaminants including numerous metals and radionuclides and various organic compounds.

Contaminants that have been remediated in the laboratory and/or field studies using phytoremediation or plant-assisted bioremediation include:

- Heavy metals (Cd, Cr (VI), Pb, Co, Cu, Pb, Ni, Se, Zn)
- Radionuclides (Cs, Sr, Ur)
- Chlorinated solvents (TCE, PCE)
- Petroleum hydrocarbons (BTEX)
- Polychlorinated biphenyls (PCBs)
- Polynuclear aromatic hydrocarbons (PAHs)
- Chlorinated pesticides
- Organophosphate insecticides (e.g., parathion)
- Explosives (TNT, DNT, TNB, RDX, HMX)
- Nutrients (nitrate, ammonium, phosphate)
- Surfactants.

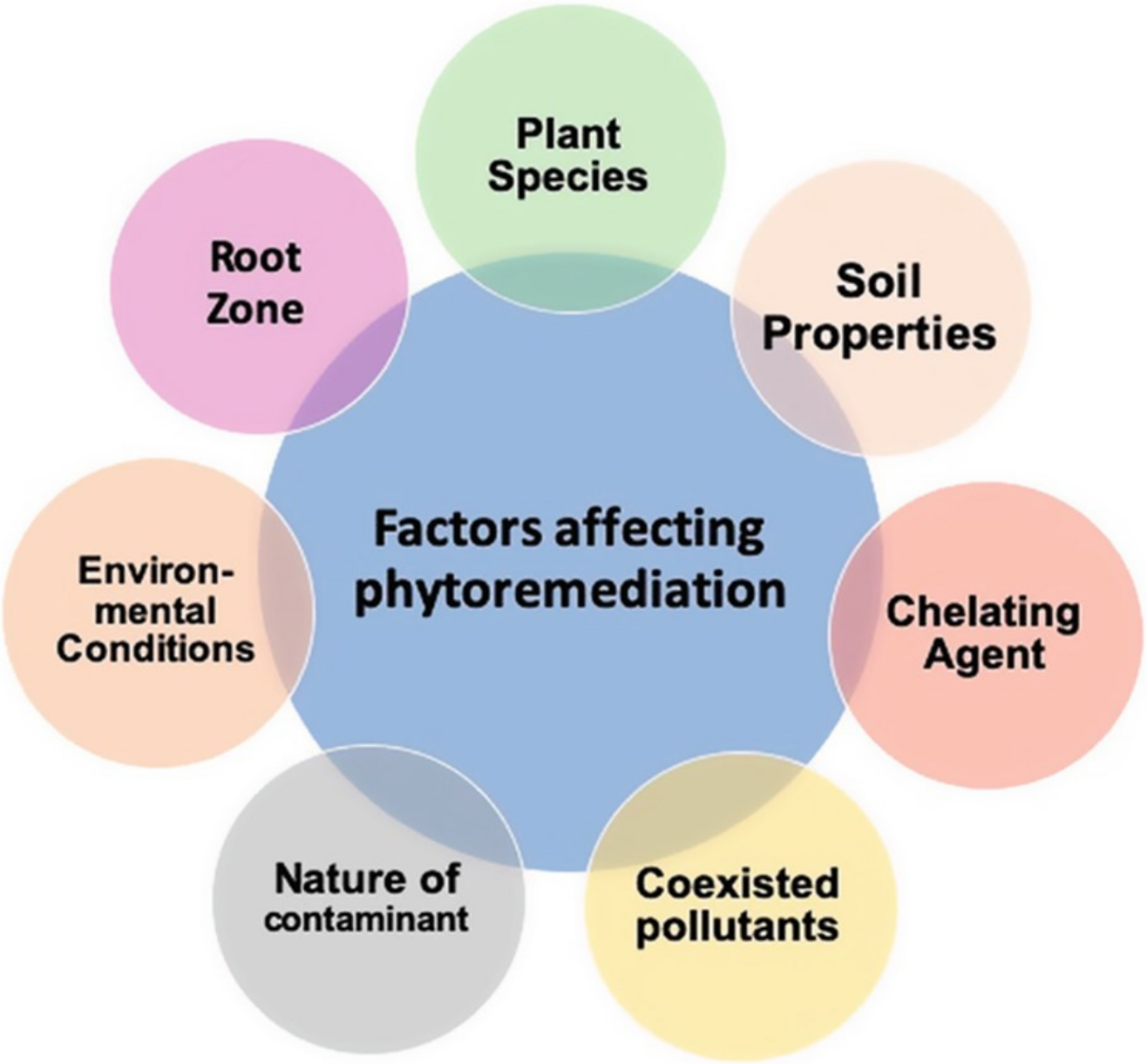
Why Phytoremediation!!

The principles of the phytoremediation system are to clean up contaminated water which includes identification and implementation of the efficient aquatic plant; uptake of dissolved nutrients and metals by the growing plants; and harvest and beneficial use of the plant biomass produced from the remediation system.
The most important factor in implementing phytoremediation are-
The selection of an appropriate plant should have a high uptake of both organic and inorganic pollutants, grow well in polluted water, and be easily controlled in quantitatively propagated dispersion. The uptake and accumulation of pollutants vary from plant to plant and also from specie to specie within a genus.
The capture of groundwater (even contaminated groundwater) and utilization for plant processes.
The economic success of phytoremediation largely depends on photosynthetic activity and the growth rate of plants with low to moderate amounts of pollution.
These systems are generally cost-effective, simple, and environmentally non-disruptive.
Ecologically sound with low maintenance cost and low land requirements.

Groundwater Remediation Method

1. Rhizofiltration

Surface water hemofiltration may be conducted in situ, with plants being grown directly in the contaminated water body. If groundwater is located within the rhizosphere (root zone), rhizofiltration of groundwater can also be in situ. Alternately, rhizofiltration may involve



Source: SpringerLink

the pumping of contaminated groundwater into troughs filled with the large root systems of appropriate plant species. The large surface areas provided by these root systems allow for the efficient absorption of metals from the contaminated groundwater into root tissues. In addition to removal through absorption, metals are also removed from groundwater through precipitation caused by exudates (liquids released from plant tissues). These precipitates are filtered from the groundwater after it passes through the plant troughs and before treated water is removed from the process loop. Roots are harvested, and depending on the species of plant used, shoots may be transplanted to grow new roots. Plants can be replaced in the system to ensure constant operation results. Rhizofiltration using sunflowers has been used in the remediation of radionuclides from surface water near Chernobyl (strontium and cesium) and water using a rhizofiltration system, as described above, at a DOE facility in Ohio.

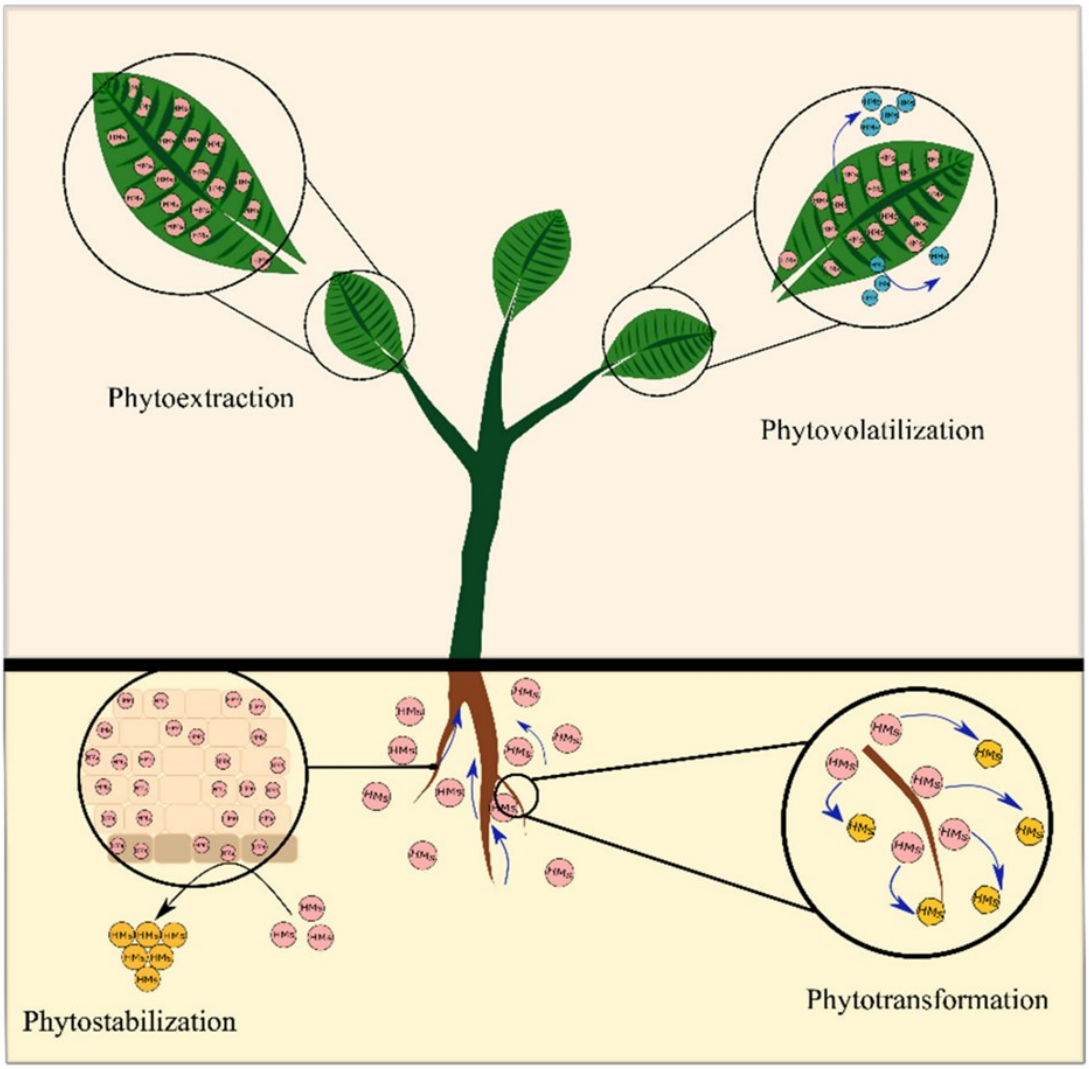
2. Phytotransformation

Surface water remediation via phytotransformation can be accomplished in situ in ponds or wetlands. In addition, groundwater can be remediated using phytotransformation in situ if the water table is within the zone tapped by deep-rooted plants such as poplars or ex-situ by pumping water to troughs or constructed wetlands containing appropriate plants. In the phytotransformation process, plants take up organic contaminants and degrade them to less toxic or non-toxic compounds. This technique is being tested on explosives-contaminated groundwater (TNT and RDX) at Milan Army Ammunition Plant in Tennessee by the U. S. Army Corps of Engineers Waterways Experimental Station (WES). In addition, an Environmental Security Technology Certification Program (ESTCP) project is testing the ability of trees with roots tapping groundwater to degrade TCE and hydrazine present in the aquifer. The U.S. Air Force is planning to evaluate phytoremediation through field studies followed by cell cultures and bio-chamber studies.

Source: Unsplash

3. Plant-Assisted Bioremediation

This technique involves the installation of appropriate plants in areas in which near-surface bioremediation is being conducted. The plants provide carbonaceous material from liquids released from roots and through the decay of root tissue. In addition, oxygen released from the root systems of these plants increases the oxygen content in the bioremediation area. These additions to the soil as a result of plant activity increase the rates of microbial activity and thus the rates of contaminant degradation. The above-mentioned ESTCP project also involves the study of the beneficial effects of plant roots on the rate of in situ bioremediation by microorganisms.



Source: IJMS

Wastewater Remediation Method

Phytostabilization

This technology is applied for decreasing the bioavailability of contamination from the environment and stabilizing pollutants occurs more than removing them (commonly metallic elements) by plants (hydraulic control). Plants can help to stabilize pollutants by taking in an adsorption system or accumulating them in the root system. Indian mustard (Brassica juncea L.) was reported as a suitable plant species for the stabilization of mercury in soil and wastewater. The aquatic plant Hydrilla verticillata was reported as potential species for phytostabilization of wastewater, this plant has a high translocation factor (TF) and low bioconcentration factor (BCF) for toxic metals (Pb, Cr) (Ahmad et al., 2011). Rapeseeds (Brassica napus), sunflowers (Helianthus annuus), tomatoes (Solanum Lycopersicum), and soapworts (Saponaria officinalis) were reported as capable plants for phytostabilization with less than one bioaccumulation coefficients obtained in all of these plants.

Phytofiltration

Phytofiltration or rhyzofiltration is a green technology for removing contaminations by plant roots in aquatic media like groundwater, most wastewater, and extracted groundwater (Pivetz, 2001; Mukhopadhyay and Maiti, 2010). Terrestrial, aquatic, and wetland plants are suitable materials for phytofiltration and constructed wetlands are the best method for removing metallic elements from wastewater (Cheng et al., 2002). Limnocharis Flava (L.) was reported as suitable plant species for phytofiltration of low concentration Cd contaminated water (Abhilash et al. 2009) Wolffia globosa is a suitable nominated for arsenic metabolism studying via phytofiltration (Zhang et al. 2009). For the effective accumulation of cadmium and hyperaccumulation of arsenic, micranthemum umbrosum was introduced as a suitable macrophyte (Islam et al., 2013). Indian mustard (Brassica juncea (L.) Czern) could uptake 95% mercury from contaminated water via phytofiltration.

Phycoremediation

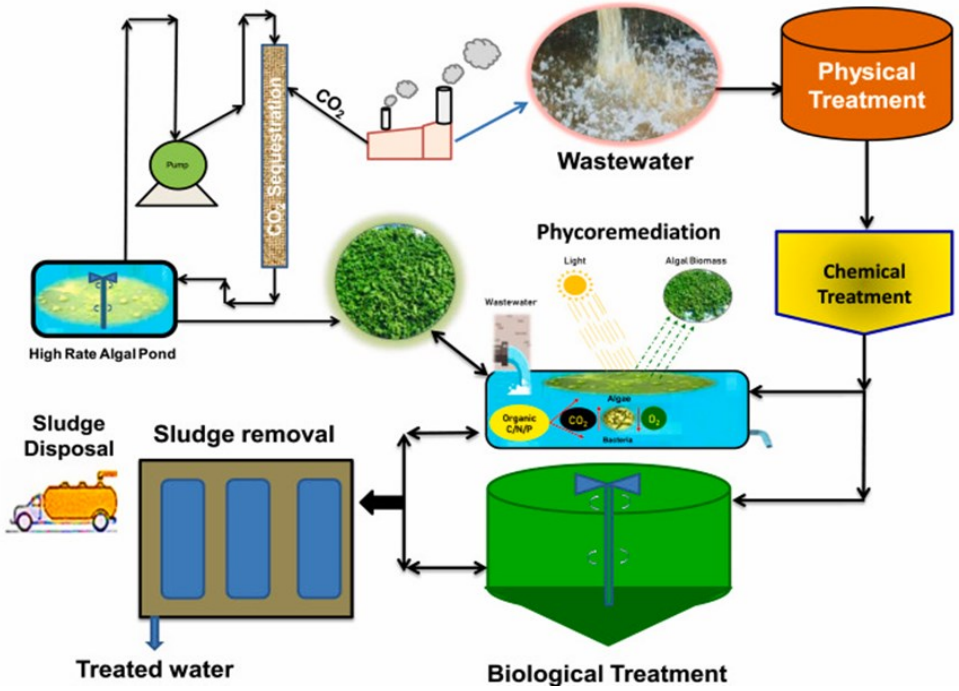
Phycoremediation is using macro and microalgae for bio-transforming or removing pollution from wastewater. Algae is a suitable plant for the decontamination of metallic elements, xenobiotics, and nutrients in various wastewater. Microalgae is a capable plant for the treatment of various types of wastewater such as industrial wastewater, domestic wastewater, and solid wastes both aerobically and anaerobically. Freshwater blue-green algae are used successfully for

the treatment of dairy manure effluent(Mulberry et al., 2008). Sewage water treated by different algae and Chlorella Vulgaris could remove almost all of the contaminations and after the treatment process, it can be thrown in water bodies.

Phytoextraction

Phytoextraction /phytoaccumulation can be considered a suitable green technology for removing metallic elements from aquatic media (Wang et al., 2008). This kind of remediation is used for the accumulation of Zinc by duckwood (Lemna gibba) (Khellaf and Zerdaoui, 2009), Cadmium by water spinach (Ipomea aquatic), Chromium with small pondweed (Potamogeton pusillus) in presence of Cu2+ (Monferrán et al., 2012). recently reported study carried out for accumulation of Pb by Ceratophyllum demersum and Myriophyllum spicatum and finally introduced as phytoremediator and bioindicator of Pb. Water hyacinth (Eichhornia Crassipes) is used for removing heavy metals from coastal water, Crude oil from artificial wastewater amended by urea fertilizer (Ndimele and Ndimele 2013), and palm oil mill effluent treatment. Furthermore, heavy metals from industrial wastewater have been removed by vetiver (Chrysopogan zizanioides).

(The rate of metallic elements removal from polluted wetlands depended on plant species, climacteric conditions, the statute of substrates, type of element (Hg>Mn>Cd=Fe>Cr=Pb>Cu=Zn>Al>Ni>As), their ionic forms (Marchand et al., 2010).



Limitation of Phytoremediation

According to the information reviewed, general site conditions best suited for the potential use of phytoremediation include large areas of low to moderate surface soil (0 to 3 feet) contamination or large volumes of water with low-level contamination subject to low (stringent) treatment standards. Depth to groundwater for in situ treatment is limited to about 10 feet, but ex-situ treatment in constructed troughs or wetlands has also been investigated.

In the least developed countries, 22% of healthcare facilities have no water service, 21% have no sanitation service, and 22% have no waste management service. We forget that the water cycle and the life cycle are one. Audrey Hepburn said that water is life, and clean water means health. Climate change will lead to greater fluctuations in harvested rainwater. Management of all water resources will need to be improved to ensure provision and quality. UNICEF works with the government to provide sustained safe water access to 24 million people by 2030. Many activities can contaminate the groundwater quality of several areas and can cause health problems. Therefore, we can conduct to treat the groundwater as well as wastewater area using the phytoremediation technique.

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The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

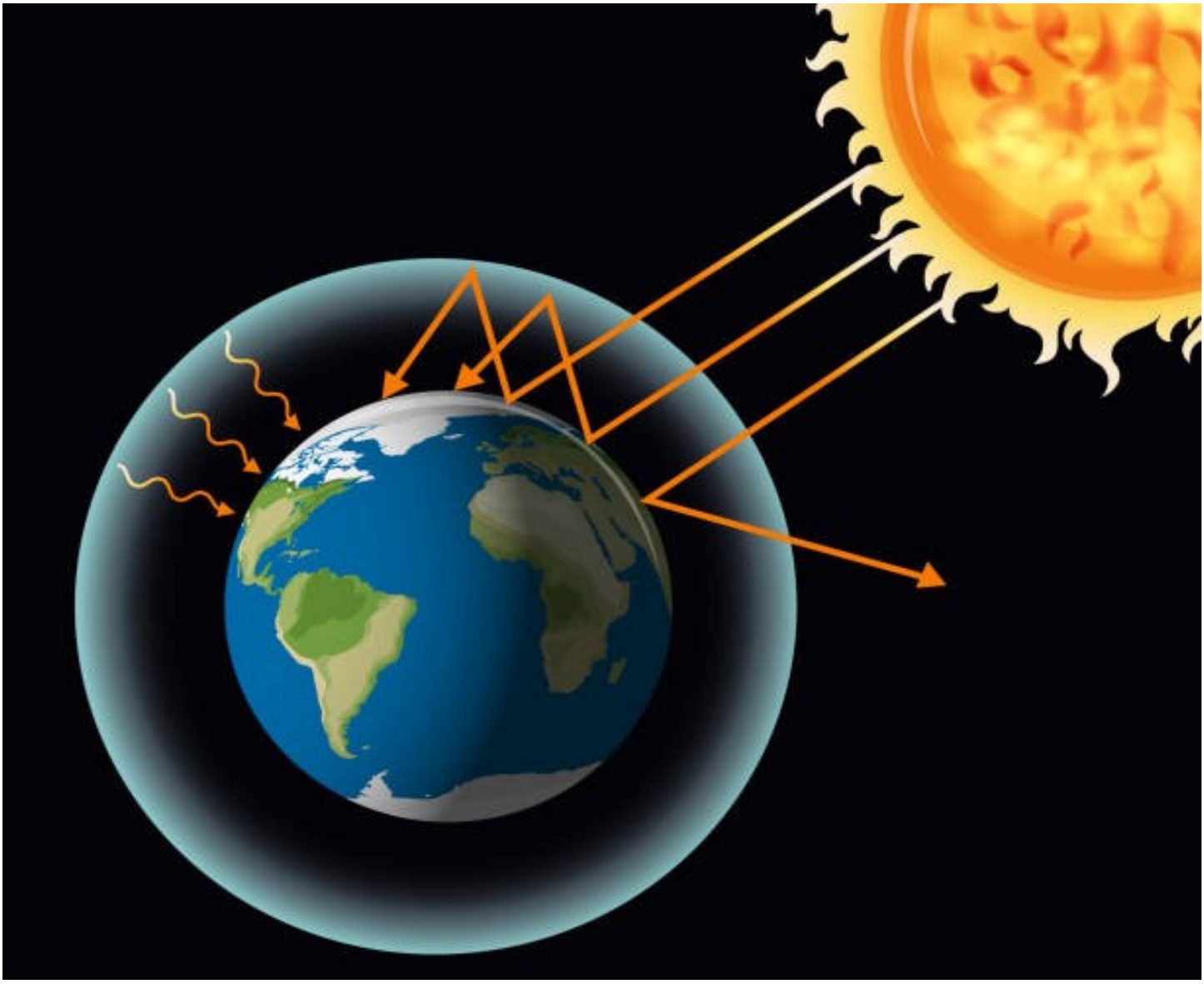
COP-27

THE ROAD TO A SUSTAINABLE ENVIRONMENT

Alok Acharja

There is debate over how much the world has benefited so far from the COP (conference of the parties). Still, world leaders are trying to come together in hopes of saving the planet. Because the world's most worrying cause is climate change. Some decisions come out. Last year's COP-27 conference was held just two months earlier 6-18 November 2022. The Conference of the Parties, or COP for short, is the climate conference of world leaders.

Before 2015, different countries and scientists emphasized climate change, but no unanimous decision has been reached yet. Finally, world leaders came together to implement the Paris Agreement to handle climate change. There are many reasons behind the failure of the decisions. Most of the fuel comes from fossil. Last year, the Cop-27 was held in Egypt,where it has been



Source: getty image

increasing oil and gas exports in recent years. Green trees are being cut down in Cairo. But these are the main challenging issues in dealing with the climate crisis. Naturally, everyone in the world is interested in this conference because the most important thing right now is climate change.

According to a study, due to climate change, the tendency of drought has increased in the world. Especially in the Northern Hemisphere, this trend has increased 20 times. Europe's temperature this year has broken all records of the past. In such a situation, this COP-27 conference the world is really important. Carbon emissions are the main cause of global climate change. And the developed world, including China, is responsible for most of the carbon emissions. Because these countries use more oil and gas. As a result of climate change, every country in the world is suffering more or less.

Children are also among the worse victims. Recently, an organization called Kids rights Foundation says that climate change is one of the threats facing the world now. About 1 billion children are currently at very high risk due to climate change damage. And a new research report from the United Nations says that the world is facing an average temperature increase of 2.8 degrees Celsius in this century due to the lack of progress made by the governments of the world in reducing greenhouse gas emissions. It is known that

ISSN: 2708-776X (print), 2708-7778 (electronic)

Source: down to earth

past year's climate conference will try to reach a commitment to reduce global warming below 2 degrees Celsius compared to pre-industrial levels and maintain it within 1.5 degrees Celsius. According to the research report, since last year's COP-26 climate conference, there has been no progress in the plans of the governments of the countries of the world to reduce carbon emissions. In this situation, it is only possible to avoid disaster if society can be transformed urgently.

The main point could be how far this conference can progress in implementing the Paris Agreement. The Paris climate agreement is the first time the world has united against climate change. Implementation of the decisions is the most vital issue. The Paris Agreement includes the issues of limiting global warming to 2 degrees Celsius, reducing greenhouse gas emissions, helping vulnerable countries, and increasing the use of renewable energy. Apart from this, there will also be the issue of financial aid to climate change-affected countries. If the decision of the Paris Climate Agreement is supported by 196 countries of the world to financially support countries affected by climate change like Bangladesh, the countries can take effective long-term measures against climate change.

The number of climate refugees within the country may decrease. Because of the excessive industrialization of the developed world, the level of carbon emissions in the world is high. Countries like Bangladesh are more and more affected by the loss of change. Natural disasters are seen like the recent cyclone 'Sitrang' and others hit one after another. Scenes of changing seasons and nature's rough appearance cause us anxiety. The trend of rising temperatures poses the threat

According to the research report, the promise made at the last climate conference, the new efforts to reduce carbon emissions will reduce the greenhouse gas emissions in the world by less than 1 percent by 2030. However, scientists say that to limit the increase in temperature to 1.5 degrees Celsius, greenhouse gas emissions need to be reduced by 45 percent.

of rising sea levels.

Despite the recognition of the responsibility of world to climate change-affected countries. If the decision of the Paris Climate Agreement is supported by 196 countries of the world to financially support countries affected by climate change like Bangladesh, the countries can take effective long-term measures against climate change. The number of climate refugees within the country may decrease. Because of the excessive industrialization of the developed world, the level of carbon emissions in the world is high. Countries like Bangladesh are more and more affected by the loss of change. Natural disasters are seen like the recent cyclone 'Sitrang' and others hit one after another. Scenes of changing seasons and nature's rough appearance cause us anxiety. The trend of rising temperatures poses the threat of rising sea levels.

Despite the recognition of the responsibility of world leaders to deal with the adverse effects of climate change, the climate conference is not working to protect the world because of the reluctance to implement the decisions. The climate change crisis is now the biggest threat to the world. Even if it is more vulnerable than war. There is no alternative way to get rid of this except by reducing carbon emissions. As a result, the whole world agrees on the implementation of the Paris Climate Agreement.

Scientists suggest changes in our lifestyle to ensure a sustainable future. They proposed six steps to reduce the harmful effects of climate change. These are, Substituting fossil fuels with renewable low-carbon fuels, especially reducing meat addiction, adopting a plant-based diet, creating a carbon-free economy, and controlling population

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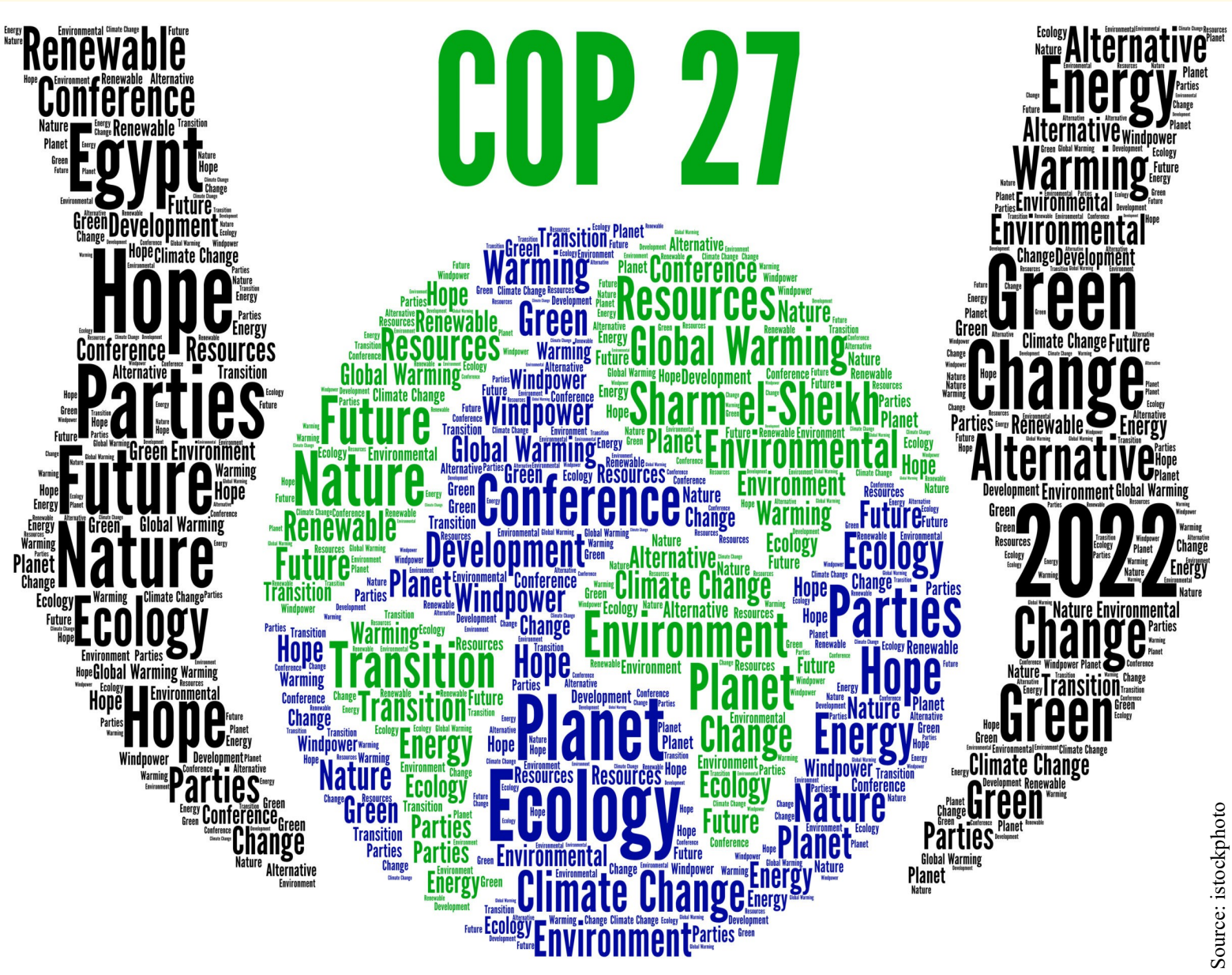

Source: istockphoto

growth.

We are going to run into danger. Although there are ways to prevent it, the problem is not one's but all. As a result, it is a lengthy process. According to a World Bank study, respiratory, water-borne diseases, mosquito-borne diseases such as dengue, and mental health are also affected due to climate change. However, it is the poorer countries renewable low-carbon fuels, especially reducing meat addiction, adopting a plant-based diet, creating a carbon-free economy, and controlling population growth.

We are going to run into danger. Although there are ways to prevent it, the problem is not one's but all. As a result, it is a lengthy process. According to a World Bank study, respiratory, water-borne diseases, mosquito-borne diseases such as dengue, and mental health are also affected due to climate change. However, it is the poorer countries that suffer the most because they are less capable to cope with change. The countries of the world which are increasing the level of carbon emissions should focus on building a sustainable environment.

Threatening the existence of the world just for the sake of development is a great folly not to find a way to

Source: leverage edu

get rid of it. Due to climate change, the earth is becoming risky for living on. Survival is becoming a threat. The 27th Climate Conference is crucial to getting the climate back to normal and the world will be looking to world leaders to see what decisions they can make to make the planet habitable. If they fail again or show an uncooperative attitude then the existence of the world will go to a more critical. From where it will be much more challenging to come back. In one word, if it fails, the destruction of this planet called Earth is inevitable. Then maybe the existence of human beings will appear in the book of extinction.

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The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

Controlled Environment Agriculture (CEA) To Alleviate Future Food Shortages

—Sajib Miah

Controlled Environment Agriculture (CEA), also known as greenhouse agriculture is a modern technology-based farming such as Indoor farming or vertical farming where crops are grown in controlled environments (Temperature, Humidity, Light, Co2 etc.). It refers to all indoor agriculture where certain aspects of the environment are controlled via technologies such as artificial light, hydroponics and aquaponics. Here, mainly produces Cherry tomatoes, lettuce and capsicum. Unlike traditional farming, controlled environment agriculture uses environmentally friendly technology to produce climate resistant crops as well as nutrient rich crops.

Source: Pixel

History traces the beginning of greenhouse agriculture to the early 1st century. The Roman emperor Tiberius had a habit of eating fresh cucumbers in daily meals. But the problem was in winter. Fresh cucumbers weren't grown in the frozen state.

So greenhouse agriculture was invented following efforts to produce cucumbers at a controlled temperature even in winter for the king. In the 14th century, Korea has a record of cultivating medicinal plants in controlled temperatures and environments. In the 17th century, many people started greenhouse agriculture in England and the Netherlands to get fresh crops even in the winter season. Technological excellence and the urge to grow own's food led greenhouse agriculture not only in cold climate countries, but also in desert countries.

Therefore, the more Prominent controlled environment agriculture has been emerged since the first modern greenhouses were developed in the 19th Century by French botanist Charles Lucien Bonaparte in Leiden, Netherlands. Over the years, greenhouses and other indoor growing methods have evolved and proliferated. Nowadays, Spain, China, Japan, Russia, Israel and so many other developed countries have developed and marketed indoor multilevel farms with impressive production statistics. For example, one Japanese farm comprises 25,000 square meters producing 10,000 heads of lettuce per day (100 times more per square foot than traditional methods) with 40% less energy, 80% less food waste and 99% less water usage than outdoor fields. According to the university of California, there are 9 million acres of controlled environment agriculture worldwide. The goal of this form of Agriculture is to utilize scientific data and engineering in order to optimize the Plants growth, reduce pests and diseases and achieve the maximum yield with the minimum input of energy.

Greenhouses are an enclosed structure with its walls and roof typically made of transparent material relying on the sunlight, using artificial light sources (LED) as a supplement. This setup can be used to cultivate plants, protecting them against external influences such as extreme climate events (droughts, cold snaps), pests and wildlife.

ISSN: 2708-776X (print), 2708-7778 (electronic)

Source: Pixel

Greenhouses come in different forms. In cold temperature areas, greenhouses can be equipped with heat insulation. In general, it can be said that their energy-savings compared to Plant Factories are 60% to 80% due to the utilization of sunlight. Their performance is heavily dependent on the amount of light that can be transmitted through its walls. The greenhouse walls and ceilings can either be decorated with glass or plastic. The traditional choice of glass has a long history of being used for greenhouses whereas plastic is relatively new to the scene. Both glass and plastic have to be able to transmit in the Photosynthetic Active Radiation (PAR) range. The transmittance is affected by several parameters, e.g. if its glazing is single or double-layer or if special additives are included in the material. Intensity being equal, direct and diffuse light both provide photosynthesis equally, but it is believed that diffuse light is more advantageous due to its ability to reach the lower plant leaves which would otherwise be shaded by the upper leaves under direct incident light.

When it comes to utilizing on the greenhouse heating effect, glass has traditionally been an excellent barrier to infrared transmission, which means that the greenhouses lets light enter through the glass and thereby manages heat better than plastic does. When it comes to cost and maintenance, both glass and plastic offer their perks. Glass can break, and plastic can tear. A break in glass is easier to patch up, but costlier to replace. Glass is fragile and more likely to break in certain situations such as closing a cold frame. On the contrary, glass is more durable and lasts longer which translates to less time having to purchase, transport and install than with plastic which needs to be replaced frequently.

In recent years, the concept of cultivating plants in a controlled environmental method, using primarily artificial light sources instead of relying on the sun has gained more prominence.

The differences between cultivating crops in a greenhouse and a plant factory:

Both greenhouses and plant factories use relatively same technologies but there are some key differences regarding the controlled parameters that need to be put into consideration during design and operational phase.

Traditionally, greenhouses mainly produce vegetables, flowers, fruits, starting from seedlings to the fully-grown plant where the plants are typically planted horizontally. The cultivation medium can be soil hydroponic, mist aeroponic or aquaponic. On the other hand, the plant factory mainly grows lower plants such as leafy vegetables, low ornamental plants, high value-added herbs and some seedlings. They use the same cultivation medium as greenhouses.

Greenhouses are generally equipped with a venting system, where the position and size of the vent are determined according to the actual local conditions. The main function of the vents is to release heat to cool down the inner temperature, but also for dehumidification and increment of CO2, as well as to discharge of harmful gases if necessary. Ventilation fans are also be installed to increase the air circulation and to ensure uniformity of gas conditions within the greenhouse. A good ventilation is also important to plant factories. This can be done with ventilation fans, as they are used in greenhouses.

In photosynthesis, CO2 is converted into carbohydrates, which plants need as energy source. In greenhouses, the concentration of carbon dioxide can be increased by adding organic fertilizer, rational ventilation, burning biogas/coal, and chemically producing carbon dioxide. In plant factories the CO2 concentration is mainly increased by releasing it into the room. This method is easy to operate and the concentration easy to control. Greenhouses use primarily sunlight and use artificial light as a supplemental light to increase the light intensity at cloudy days or evening time. Plant factories exclusively use artificial light sources, such as high-pressure sodium lamps, high-frequency fluorescent lamps, and LED luminaires. This gives them a higher control over the plant de-

Source: Pixel

Source: Pixel

velopment enabling them to enhance crop quality, taste and appearance.

Both greenhouses and plant factories provide plants with a more compatible environment for growth but in contrast, greenhouses are less automated and environmental controls are less precise than plant factories. In general greenhouses utilize single or double layers. This means that the land utilization rate is low compared to plant factories. However, due to lower the

construction and operating cost greenhouses remain one of the main setups in agriculture.

◊ **The Interrelation between CEA and Sustainable Development Goals (SDGs):**

The United Nations Sustainable Development Goals (SDGs) are 17 goals with 169 targets that all 191 UN Member States have agreed to try to achieve by the year 2030. The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including poverty, hunger, inequality, climate change, environmental degradation, peace and justice.

The rate at which world's population is increasing, there is no other option but to increase food production at the same rate. By 2050, the world's population will reach 10 billion. In order to meet the food demand of this increased population, the rate of food production must increase. But crop land is decreasing at a significant rate every year. As a result, the method of growing more crops on less land has to be adopted for the production of food for the increased population on the gradually decreasing cropland.

In this regard, controlled environment agriculture can be the best method of farming that can fulfill the growing demand for food production. CEA can significantly contribute to avoiding global hunger in light of population growth.

Not only can it produce nutritious and diverse crops towards meeting basic human dietary needs, but CEA also offers the opportunity to develop new varieties of seeds with enhanced crop resilience for better climate adaptation. As demand for food production continues to rise, it is clear that in order to meet the challenges of the future in terms of food security and environmental sustainability, radical changes are required throughout all levels of the global food system. Controlled Environment Agriculture (CEA) (indoor farming) has an advantage over conventional farming methods in that production processes can be largely separated from the natural environment.

Thus, production is less reliant on environmental conditions and pollution can be better restricted and controlled. While output potential of conventional farming at a global scale is predicted to suffer due to the effects of climate change, technological advancements in this time will drastically improve both the economic and environmental performance of CEA systems.

While the conventional agriculture is directly related to local environmental conditions, the needs of CEA systems are drastically different. Commonly-used CEA systems such as hydroponics and aeroponics are able to grow crops in inert mediums (e.g., rock wool, saw dust, coconut husk and hemp) and do not require soil.

Therefore, large-scale CEA operations can be carried out on land where soils are considered barren or contaminated, as the crops are not grown using the terrain itself. This means that CEA systems can in theory be built and thrive in any location, including deserts, tundra or industrial urban areas.

Thus, CEA can produce year-round crops and achieve the zero hunger target all across the world.

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The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

COMBAT NATURAL DISASTER:

Aim to Raise Awareness

Zannatul Mouwa

Source: www.willmarradio.com

While the whole world is severely affected by the Corona, the terrible grip of natural disasters is still wreaking havoc on many people around the world. All the projections of scientists show that the number and severity of climate-related disasters are increasing due to climate change, which is cutting off the coronavirus infection and public health response in the wake of the epidemic. The compound risk arising

from the perfect combination of corona and natural disasters is having an unprecedented impact on economics, livelihoods, business, and education.

A global report was released on June 30 on the progress made by the United Nations in achieving the Sustainable Development Goals (SDGs). According to the report, Bangladesh ranks 109th out of 16 countries in the world. Bangladesh ranks fifth among South Asian countries. According to the report, Bangladesh is on the right track in poverty alleviation. However, although it is successful in alleviating extreme poverty, the success rate in alleviating poverty is low. The hunger eradication indicators show that although Bangladesh has done well in three indicators, it is in a state of stagnation and two are facing challenges.

When the report was published, Bangladesh, like the rest of the world, was overwhelmed. Soon after the report was released, a large part of the country was facing long-term floods. In this context, the government has set a goal to free the country from poverty in order to achieve the SDGs, which are not possible to implement in time. However, development experts say that in order to continue achieving the SDG targets in the face of the Corona and floods, at least one crore of people will need to be provided with the necessary food aid for six months. As well as the need to rearrange the budget. There will be a lot of emphasis on poverty by restructuring funding.

Flood in Bangladesh is like a blow to the country! After the deteriorating flood situation in Kurigram, Gaibandha, Jamalpur, Sylhet, and Sunamganj districts, the southern part of the country is now flooded. However, the people of the south are still suffering from the effects of the Ampan. However, these situations are catastrophic not only in Bangladesh but also in the whole world during the Corona period. After the extreme damage in West Bengal Ampan, various provinces of India were affected by the floods. In April, the entire South Pacific Island Category 5 tropical cyclone suffered extensive damage. The coronal period saw

Source: www.pixabay.com

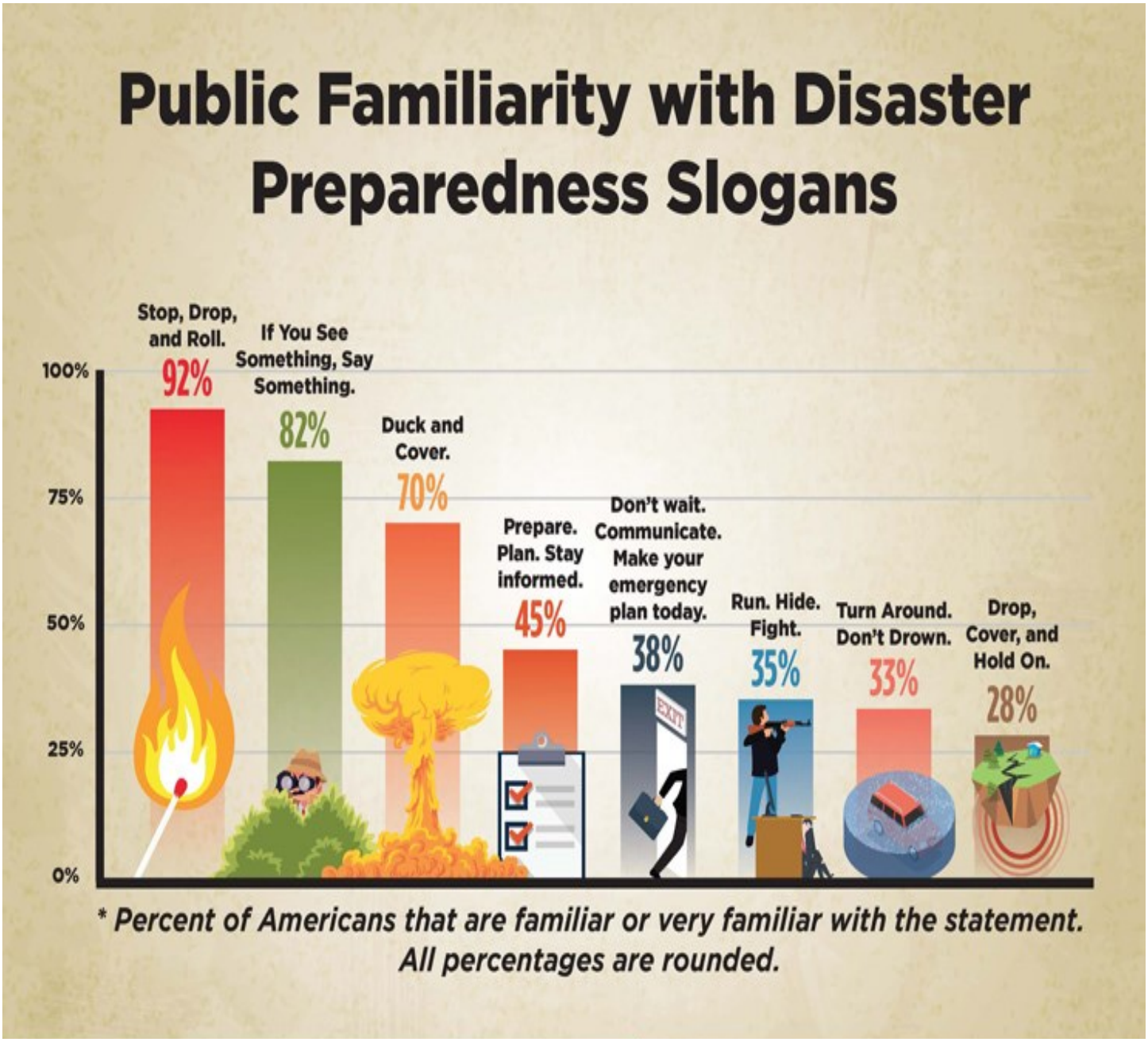
unprecedented droughts in Zimbabwe, floods in Somalia, and severe droughts and wildfires in Australia.

Man is a small part of nature. But the rate at which people have tried to control nature (in vain) is inconceivable. Many call the coronavirus the "proper response of nature," for which humans are responsible. Because people are exploiting nature and the animal kingdom. The coronavirus vaccine may come today or tomorrow, but there is no vaccine to protect against climate change. So, we have to think about climate, especially to survive natural disasters.

Source: hchatexas.org

Natural disasters, such as flood, droughts, cyclones, and heat waves, are dealt with mainly by structural and non-structural (e.g., land use planning, flood monitoring, and public awareness). Scientists say to increase the application of nature-based solutions to deal with or reduce natural disasters, although the ideas for these solutions are relatively new. The International Union for Conservation of Nature (IUCN) says it is vital to focus on finding natural solutions to natural disasters. Similarly, Bangladesh is lightly talking about Delta Plan 2100 and nature-based solutions.

The social, economic (tourism and energy savings), and environmental (carbon storage and heat reduction) benefits of nature-based, green infrastructure or nature-based solutions are enormous. In addition, the co-benefits of these solutions are enormous, which include



Source: chapman.edu

the climate action agenda (adaptation and mitigation), reducing the risk of natural disasters, and increasing the conservation of biodiversity.

Again, nature-based solutions prevent air, water, and noise pollution. Poor countries like Bangladesh need these strategies more because of the limitations of our investment in gray infrastructure. However, in the wake of climate change, natural disasters cannot be fully addressed with gray infrastructure, it is a proven fact.

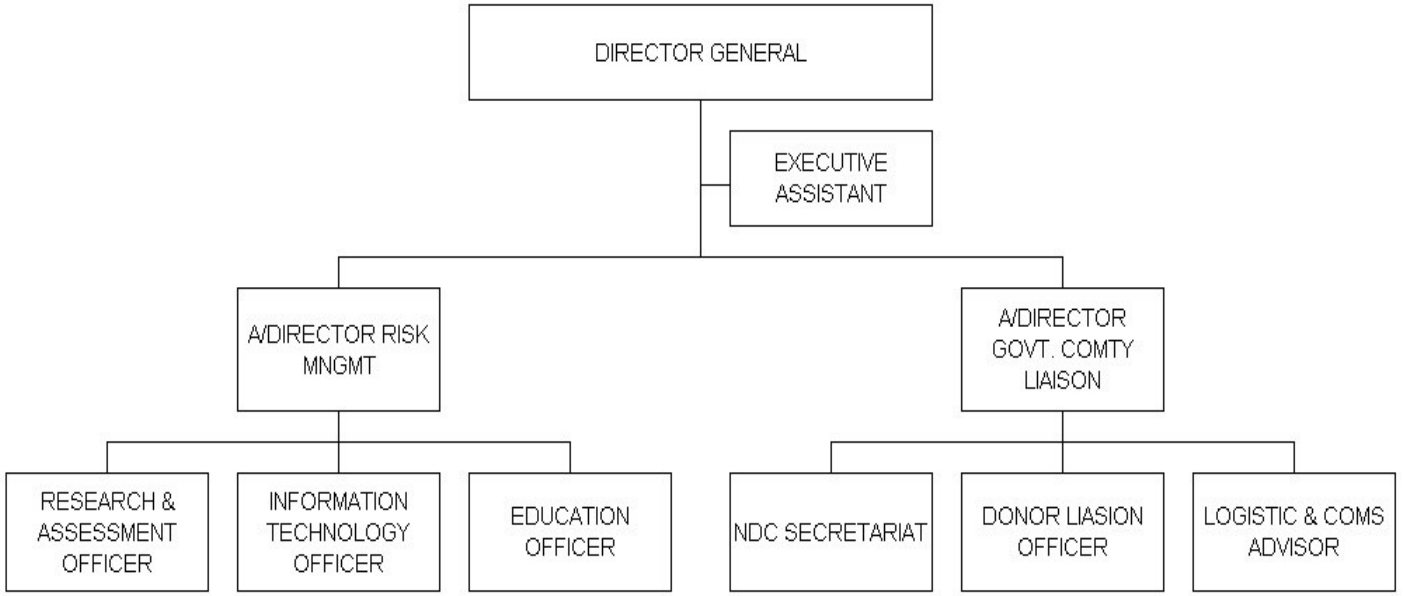
The World Bank has shown that investment in nature-based solutions to deal with or reduce natural disasters is on the rise. In the 2012-2017 fiscal year, the World Bank invested 1.2 billion in nature-based solutions (in 34 projects) to reduce the effects of flooding and flooding. Since Typhoon Haiyan, the Philippine government has invested 22 million in mangrove and natural beach forest conservation. Following the devastating 2011 earthquake and tsunami, the Japanese government spent about 2.5 billion Japanese yen on

coastal forest expansion. According to the World Resource Institute, Vietnam has focused on re-establishing mangrove forests for coastal flood control, which will save about US 215 million. In order to control surface flooding, with green infrastructure predominating in urban design, China is investing heavily in building 30 Sponge Cities. In flood control of the city, Germany is also walking the path of China. We should invest more in nature-based solutions that are compatible with our country.

Natural disasters, such as floods, require short- and long-term effective measures for the control and proper implementation. For example, increasing the navigability of the river. In order to clean the course of the river, it is necessary to increase the navigability and water-holding capacity of the river by removing the silt accumulated in the course of the river by dredging with advanced technology. Where and how to increase the navigability of the river should be done on the basis of proper assessment. In this case, coordination between thematic research and technology is vital. Experts say the river's natural energy needs to be used to increase depth.

The government needs to take continuous steps to address the causes of floods and waterlogging that are man-made. Flood control has no alternative but to clear rivers, canals, beels, haors, and other wetlands. It is impossible to control floods in many district towns including Dhaka and Chittagong metropolis by filling the wetlands around the city and blocking the normal flow of water. In order to reduce waterlogging in the city, it is necessary to plan, formulate and implement proper design for the entire city and surrounding areas without finding area-based solutions. All in all, the solution is not flood control, but management.

During the Corona period, the middle and lower-middle-class families of the country are going through the most hardships. Many have become poor. Although the income has decreased, the



Source: www.adrc.asia

Source: www.tcs.com

amount of expenditure has remained the same. In order to run the household, the working people of the village and the members of the working middle and lower-middle-class families have to work hard. Ongoing floods have multiplied the suffering of middle- and lower-class people. Every year floods, flash floods, and cyclones cause extensive loss of life and property. In fact, we live with it. Therefore, it is time to take long-term sustainable action to deal with floods and storms. Public-private assistance during the floods is insufficient. If the post-flood rehabilitation plan is not properly formulated and implemented, the economic crisis in rural areas will intensify.

Sustainable disaster response depends a lot on how much emphasis we place on nature-based solutions. According to the report of the fifth assessment of the IPCC, Bangladesh is facing many big challenges due to climate change. If we do not succeed in tackling this disaster, it will not be possible to build a safe, climate-resistant, prosperous delta.

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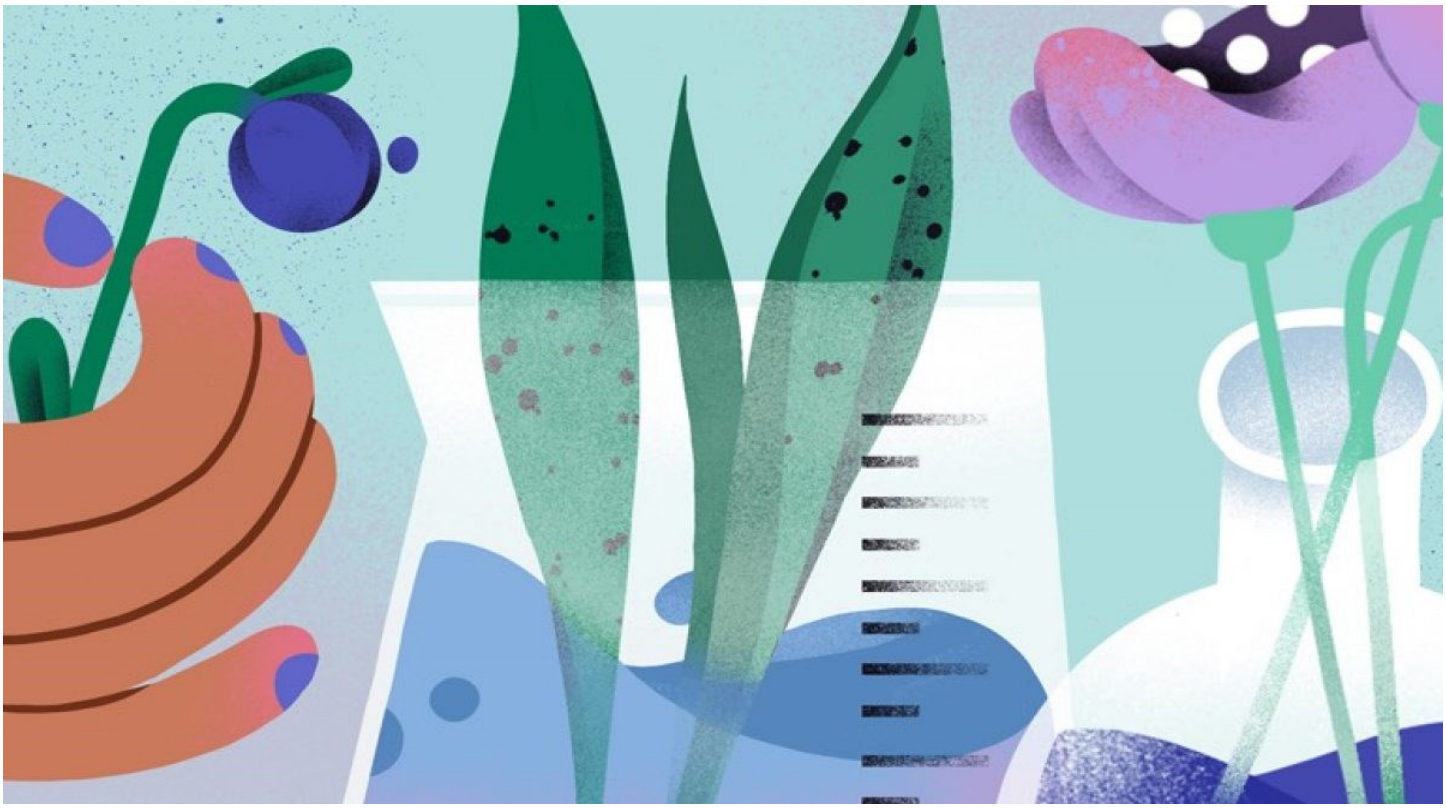
The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

Sustainable Future of Environmental Biotechnology

Mahmud Kamal Anamul Haque

Environmental biotechnology is the integration of scientific and engineering knowledge that is employed to restore a degraded environment. Environmental biotechnology gained importance and prominence in the 1980s, along with setting standards for the industry and enforcing compliance, and enforcing laws to protect the environment. Environmental biotechnology is not a new field



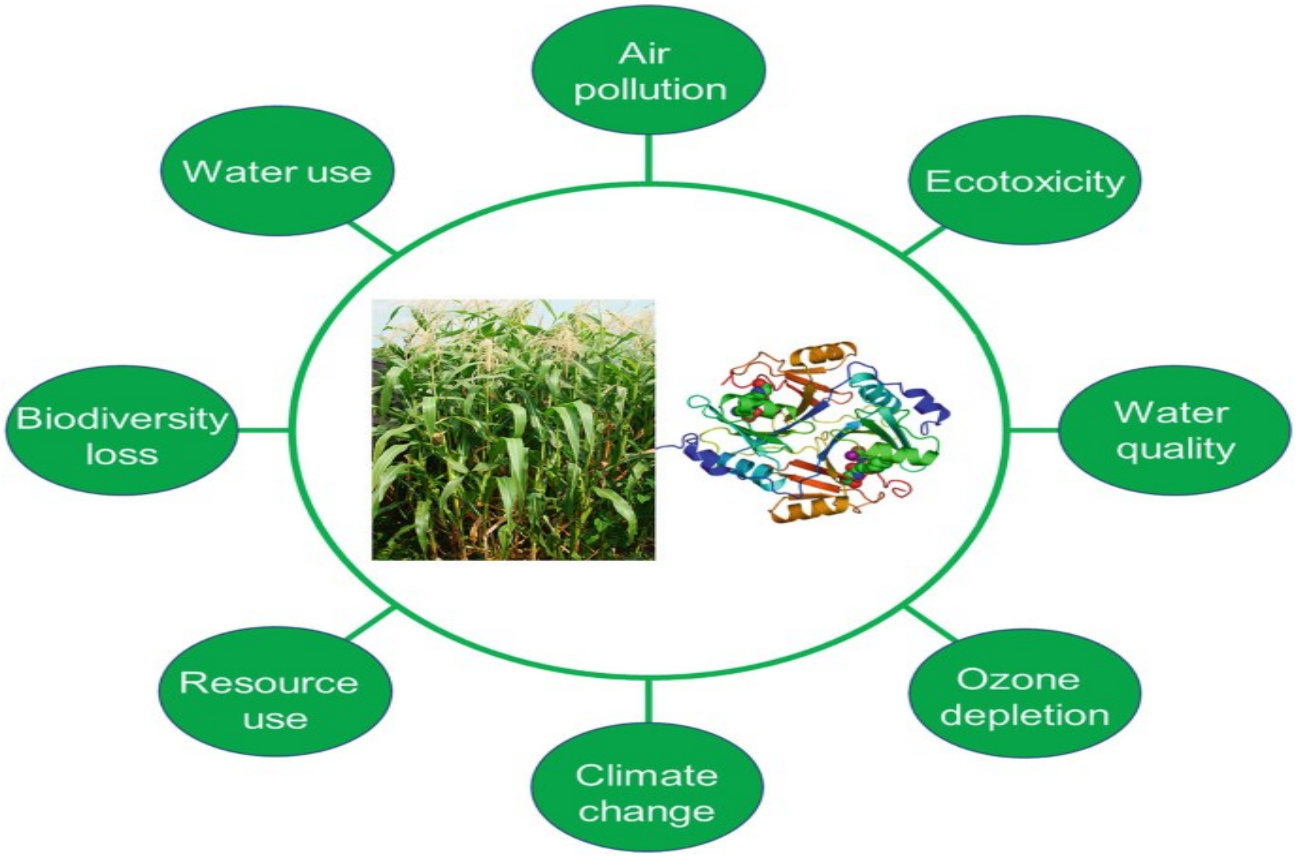
Source: Labiotech

of science. It has been there for generations and we are well acquainted with some of the old technologies such as wastewater treatment, coping, etc. It contributes to the advancement of environmental engineering.

As a result of rapid industrialization, urbanization, and other developments, the threat-free clean environment, and natural resources have declined. High consumer demand and high quality of life have been fueled by air pollution with harmful gases, polluted air in hazardous industries, the use of polluted water and pesticides, and the use of non-biodegradable products. Some of these pollutants can be easily reduced or removed by various methods, but unfortunately, some environmental pollutants are resistant to a process or stimulus and accumulate in the environment. Furthermore, treatment of some contaminants by conventional methods such as chemical degradation, combustion, or landfilling can create other contaminants, which affect the presence of large amounts of harmful wastes in the environment and determine additional considerations based on its development with alternative, economical, and reliable biological treatments.

Environmental biotechnology further defines the need for the development, use, and control of biological processes to remedy polluted environments (land, air, water) and for environmentally friendly processes, green production technologies, and sustainable development. Environmental biotechnology can be described as the maximum use of nature through plants, animals, bacteria, fungi, and algae. In addition, biotechnology can be used to effectively monitor, evaluate, model, and deal with contaminated water, air, and solid waste flows. Process modeling using environmentally polluting sources and biologically based methods is becoming increasingly important, largely due to the validity of these national strategies. The various biotechnologies available today are thus working on the sustainable use of various biological processes for wastewater, air, and solid waste management such as well-established technologies.

Environmental biotechnology (biotechnology) plays an important role in protecting biodiversity (plants, animals, and humans). Expeditions for a safer planet have created a variety of innovations to increase efficiency and promote sustainability. Various government agencies, government, and non-government organizations are currently investing heavily in environmental biotechnology.



Source: Springer Link

The application of environmental biotechnology in wastewater treatment and bioremediation has not even come halfway. Future expectations of rapid improvement and development in the industry are present as more research resources are now available. Various governments around the world have developed policies to facilitate the acquisition of patents for global and efficient environmental biotechnologies. More public awareness is needed to educate different communities about the importance of using biofuels against toxic pollutants. Environmental protection is a global issue like climate change and global warming is a wake-up call.

People are now much more aware of preventing global warming. The first World Earth Summit was held in 1992 in Rio de Janeiro, Brazil with the participation of 162 countries to make the world habitable by avoiding environmental pollution. In December 1997, a landmark agreement, known as the Kyoto Protocol, was signed in Kyoto, Japan, at the initiative of the United Nations Climate Change Convention. The agreement sets out six greenhouse gas emissions and reducing emissions. These six gases are carbon dioxide, methane, nitrous oxide, hydrofluoric carbon, perfluorocarbon, and sulfur hexafluoride.

Biotechnology is creating tremendous opportunities to increase global agricultural production and is working to protect the environment by reducing the use of agrochemicals such as pesticides and fertilizers.

Biotechnology is playing an important role in achieving a beautiful environment and sustainable development using environmentally friendly crops such as insect-resistant, herbicide-tolerant species. Producing crops that can fix nitrogen and purify the environment. Global food demand is growing. On the other hand, existing land and agricultural fields have improved production and the use of modern plant breeding methods that are capable of increasing crop yields such as lemon trees to improve soil structure, organic matter, and fertility. They also play a role in conserving biological resources and preventing soil erosion. Some beneficial effects of animals have been dis-

Source: Stoodnt

cussed in increasing the production of the environment. Our lifestyle is constantly changing in the technological revolution. There is a huge chunk of this technology across chemical technology. Different types of industries are being developed based on different types of chemical technologies. In these industrial factories, we are making various kinds of daily necessities.

Environmental pollution is a common problem in all countries of the world. Various conferences, seminars, and agreements are being held to prevent pollution. Scientists are talking about using environmentally friendly alternative technologies. But as a result of environmental pollution, our future is becoming increasingly uncertain. Rich countries are more responsible for this uncertainty. However, no country is free from the negative effects of this environmental pollution. So, it is important to maintain the balance of the environment if we are to survive on earth. And without that, our existence can disappear from the earth.

Biotechnology (biotechnology) has already begun to assist people in every area of life worldwide. The environment and biotechnology, which focuses on agriculture and nature, have made great strides in the past few years, especially in natural ways of producing crops and clearing contaminated land. With the help of environmental biotechnology, the world's food advances will continue, food security will increase, crop production around the world will improve, damaged economies will be helped and the environment will be built as a safe and clean place for animals and humans to live.

One of the major goals of environmental biotechnology is to be able to feed the world's growing population comfortably by 2050, especially in third-world countries, which has become a major factor in the fight against global hunger. The world is moving towards a better future with the future support of environmental biotechnology.

The Environment *Review*
ISSN: 2708-776X (print), 2708-7778 (electronic)

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ISSN: 2708-776x (print), 2708-7778 (electronic)

October-December 2022

The Environment *Review*

Web: www.envreview.com
E-mail: editor@envreview.com

With Cover — 40 pages
Price: BDT 100.00, USD 2.00