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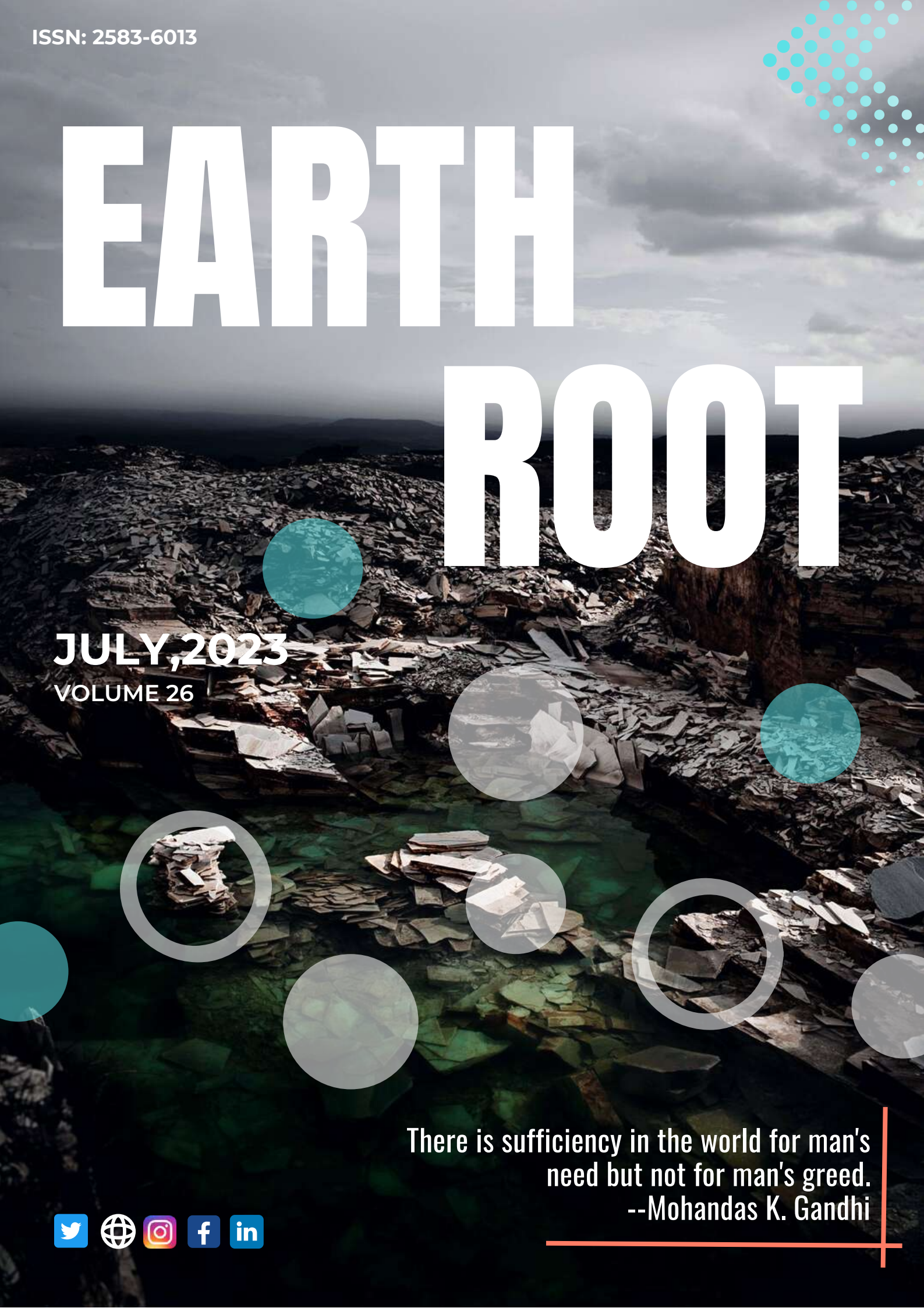

There is sufficiency in the world for man's need but not for man's greed.
--Mohandas K. Gandhi

About E-magazine

"Earth Root" is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.

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Gargi Rawat,
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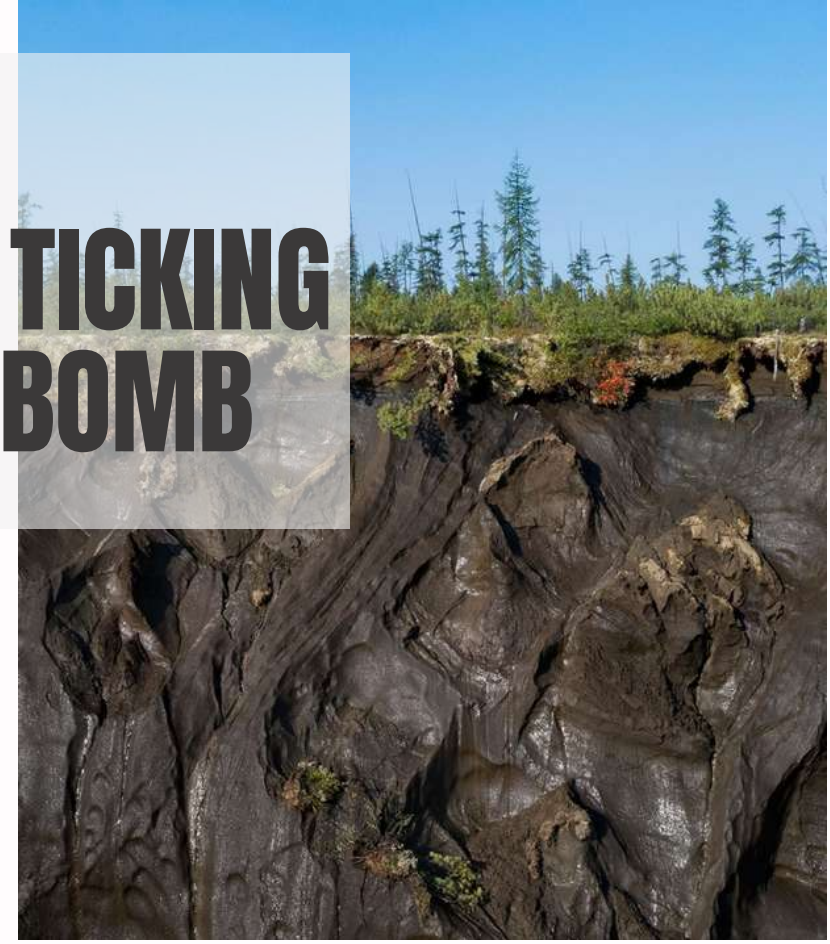


What is permafrost?

Permafrost frost literally translates to permanent frost (ice). It is any sort of ground that has been continually frozen for at least two years and up to hundreds of thousands of years. It can go from a few feet to more than a mile deep beneath the earth's surface.

A fourth of the land in the Northern Hemisphere is covered by permafrost, which can cover huge areas like the Arctic tundra or just one, solitary location like an alpine peak.

Where is Permafrost Located?

Permafrost covers about a quarter of the whole northern hemisphere, an estimated 9 million square miles—nearly the size of USA, China, and Canada combined. Permafrost is also located in Russia's Siberia, Canada, Greenland, and Alaska's Arctic regions. In addition, it can be found in subsea permafrost on the bottom of the Arctic Ocean, on the Tibetan plateau, and in high-altitude regions like the Rocky Mountains. Permafrost can be found below Antarctica and in mountainous areas such as the South American Andes and New Zealand's Southern Alps in the Southern Hemisphere.

How is Permafrost formed?

When ground temperatures fall below 32°F (0°C), water that has been trapped in silt, soil, and the pores, fissures, and fractures of rocks freezes. Permafrost is the term used to describe the state of the ground after at least two years of continuous freezing.

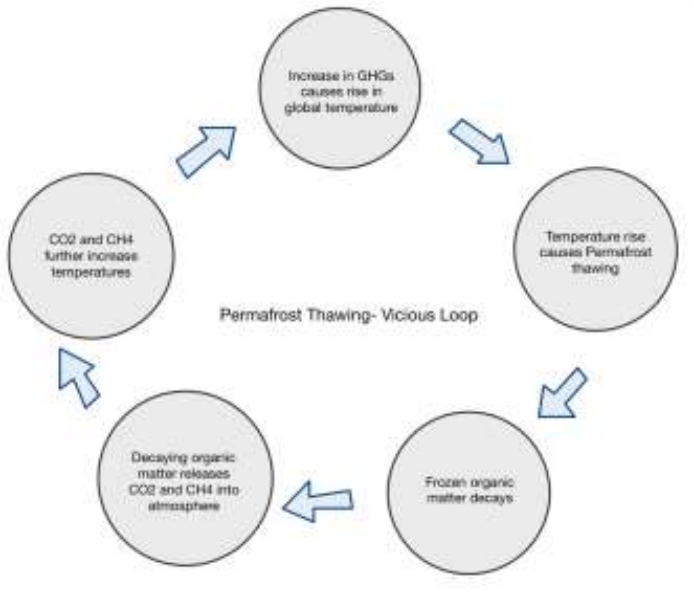
Environmental Impacts of Permafrost Thawing: From Sink to Source:

Carbon dioxide, methane, and other greenhouse gases that contribute to global warming are released into the atmosphere when plants and animals die. The process is effectively stopped by a deep freeze which preserves the remains of the creatures and the gases they would release. The microbial decomposition of those organic components and the emission of greenhouse gases recommences when frozen soil thaws. Permafrost is one of the planet's major reservoirs of greenhouse gases and is packed with fossilised life, from human to woolly mammoth remains. However, these carbon stocks are at danger of release due to global warming. There are several estimates of how much carbon and methane will be released as a result of permafrost melting, and one such study found that between now and 2100, as much as 92 billion tonnes of carbon might be released.

Eventually, a vicious loop may be set off as thawing permafrost releases more of its enormous supply of greenhouse gases into the atmosphere,

warming the climate and melting even more permafrost that emits carbon and methane. This could eventually cause the Arctic to switch from being a carbon sink that absorbs emissions to a carbon source.

According to a recent study, the Arctic permafrost represents a vast reservoir of naturally occurring mercury, a toxic neurotoxin. In fact, it is estimated that permafrost soils contain almost 15 million gallons of mercury, or almost twice as much as is present in the ocean, atmosphere, and all other soils combined. However, once released, that mercury has the ability to enter ecosystems and even food supplies via water or air.

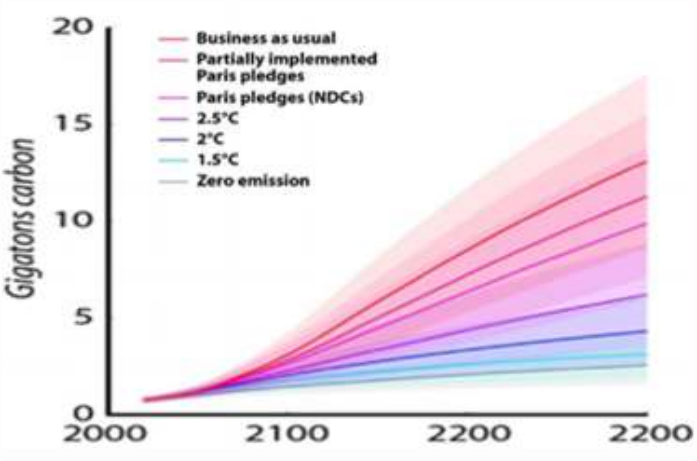


Global Warming!

Long-locked carbon deposits in the permafrost are leaking out. Around 1,700 billion tonnes of organic carbon, almost twice as much as the amount of carbon presently present in the atmosphere, are found in permafrost. Methane is around twenty-five times more potent as a greenhouse gas even though it remains in the atmosphere for only 12 years as opposed to centuries for CO2. Permafrost thawing is a carbon "time bomb".

While temperatures are rising worldwide due to global warming, the Arctic is warming at twice the rate as the rest of the world. Additionally, as below-ground temperatures rise along with surface air temperatures, permafrost begins to thaw.

According to scientists, the amount of frozen ground in the northern hemisphere has decreased from the early 1900s by 10%. According to a recent study, an additional 1.5 million square miles of permafrost may eventually melt away for every 1°C of warming. Even if we achieve the climate goals established during the 2015 Paris climate agreement , more than 2.5 million square kilometres of ice-covered land may still disappear from the planet.



Methane emissions from thawing permafrost. Source: Yumashev et al. (2019)

Damaging ecosystems!

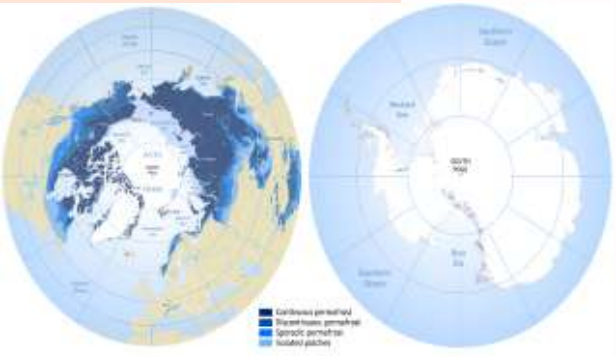
Permafrost thawing also affects natural ecosystems in a variety of ways. It can produce thermokarst, which are characterised by "drunken forests" of crooked trees and small ponds with sagging ground. It can increase soil's susceptibility to landslides and erosion once it has frozen solid, especially along coasts. As this softened soil erodes, it may add new silt to waterways, which may change how rivers and streams flow, deteriorate the quality of the water (including by adding carbon), and have an effect on aquatic life. As there is no frozen buffer to keep the water in place, wetland conditions worsen alongside permafrost. This may result in drier land that is more prone to wildfires, which further expose permafrost to warming. Sea level rise can potentially be a result of permafrost melting. In fact, if all of the permafrost on the planet thaws, it is predicted that sea levels might increase by as much as four inches, more than doubling the risk of flooding.

Dilapidating infrastructure!

The permafrost zone is home to 35 million people who reside in towns and cities that were constructed on top of what was once thought to be permanently frozen ground. The infrastructure these communities rely on, however, becomes more unstable as that firm ground sags. Cities in northern Russia are in disrepair. Roads in Alaska are evolving like roller coasters. Ground swells as a result of subsurface water freezing into ice and expanding. In Canada, it is projected that thawing permafrost costs the Northwestern Territories' public infrastructure tens of millions of dollars annually in damage.

Risk of diseases!

Permafrost has the ability to retain and preserve ancient microbes, much as it does with carbon and other greenhouse gases. It is thought that some bacteria and viruses can remain dormant in the cold, dark confines of permafrost for thousands of years before awakening when the ground warms. Even while the idea of "zombie" pathogens seems terrifying, there are still uncertainties regarding the level of risk that these ancient microorganisms offer. The potential danger was illustrated by a 2016 anthrax epidemic in Siberia, which was connected to a decades-old reindeer carcass revealed by thawing permafrost and contaminated with the bacterium. Human interaction with thawed and redundant zombie microbes will rise as the Arctic is developed and millions of tonnes of permafrost are cleared to mine for precious metals and petroleum.

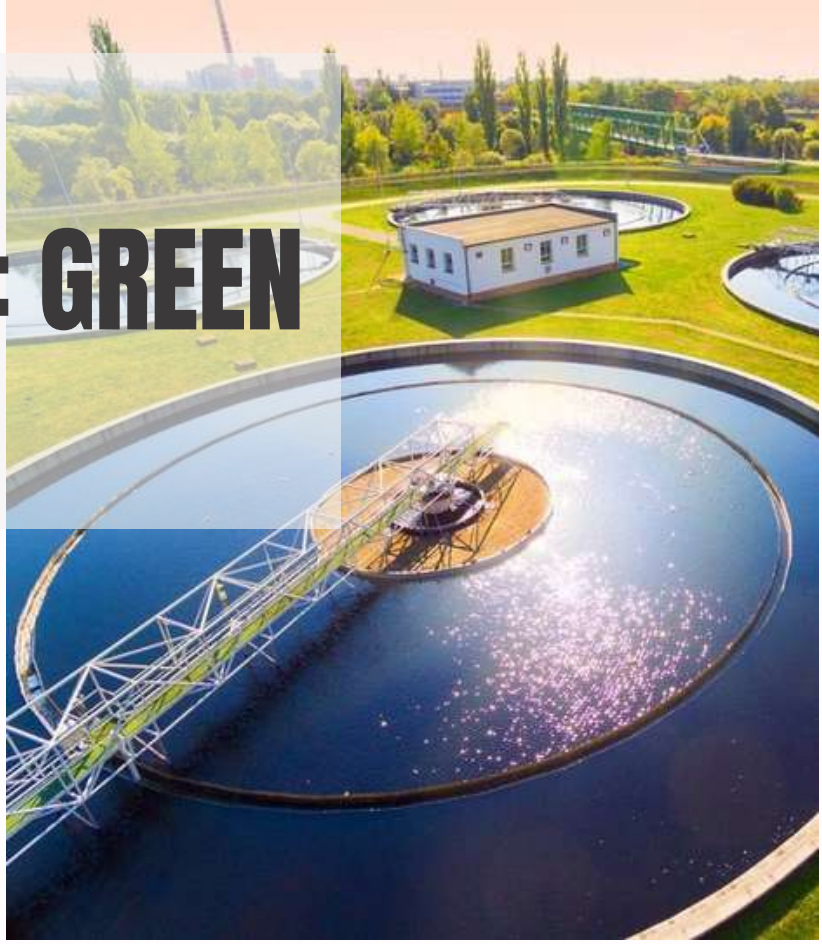


Permafrost Distribution. Source: Brown et al. (1997)

How do we stop Permafrost from thawing?

The tundra and the permafrost underlying it might seem a million miles faraway to the majority of us. However, regardless of where we reside, the choices we make on every single day ultimately contribute to climate change and have a significant impact on the world's climate. We can help protect the permafrost on the earth and stop the vicious loop of global warming by lowering our carbon footprint, purchasing energy-efficient products, and supporting climate-friendly organisations, laws, and policies. The primary issue with permafrost is that it will continue to melt and release carbon even if human emissions are reduced. Permafrost won't thaw all at once, and the carbon will not be released in one go as a huge puff. Instead, it will slowly leak out over decades or perhaps centuries. According to the IPCC study, the thawing permafrost would have an impact on more than 1,200 communities, 36,000 buildings, and four million people, worldwide. This puts the hard-won Paris climate objectives to keep the increase in global temperatures at well below 1.5C—compared to preindustrial levels under jeopardy from the planet-warming gases leaking from permafrost.

ENVIRONMENT MANAGEMENT: GREEN TAXES



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WHAT ARE GREEN TAXES?

International bodies such as the International Monetary Fund and environmental organizations support the idea that environmental taxation, also known as green taxes or eco-taxes, is an effective approach to combat climate change.

These taxes are imposed on activities that harm the environment, with the tax base being a physical unit or similar measure of the specific environmental impact. For example, a carbon tax penalizes industries and organizations that emit harmful carbon dioxide gas. Proponents of green taxes highlight their effectiveness in reducing pollution, generating government revenue, and fostering the development of green technologies. However, critics raise concerns about the increased costs for certain industries and the lack of standardized definitions and implementations for such taxes.

The push for direct green taxes emerged during the 1970s as environmental issues became more prominent in public awareness. However, the challenge of dealing with industries that heavily relied on fossil fuels hindered governments from implementing comprehensive measures against pollution. Green taxes encompass various forms, such as carbon taxes, noise taxes, and fuel efficiency taxes, to name a few.

The "polluter pay principle" is a concept that advocates for the idea that those who cause pollution should bear the costs associated with it. In the context of green taxes, this principle implies that the costs of environmental damage caused by certain activities should be reflected in the prices of the goods and services produced by the polluters. Green taxes are a way to implement the polluter pay principle by imposing taxes on activities that pollute or harm the environment. By levying these taxes, the aim is to incentivize polluters to reduce their harmful emissions and encourage the adoption of cleaner and more sustainable practices. The revenue generated from these taxes can also be used to mitigate the environmental impact or invest in environmental initiatives. Overall, the polluter pay principle serves as a guiding principle for the design and implementation of green taxes, ensuring that those responsible for environmental damage take responsibility and contribute to environmental protection.

These taxes aim to make polluters financially accountable for the negative impacts they generate.

By paying taxes proportional to the level of pollution they cause, companies and industries are expected to internalize the costs associated with the harm they inflict on their surroundings. However, green taxes can lead to increased production costs for these industries. The concept of green taxes originated in Finland in 1990, with the proposal of a carbon tax, followed by Sweden and Denmark. Currently, 16 European countries impose a carbon tax on polluting industries. Some countries, like France, have expanded the scope of green taxes to include other forms of pollution, such as noise pollution, by implementing a noise tax on airport operators. Green taxes can be applied to various types of pollution and industries, including air pollution, waste management, energy production, mining, and noise pollution.

BENEFITS OF ENVIRONMENTAL TAXES:

One of the advantages of green taxes is that they provide incentives for investment in alternative technologies. As green taxes make conventional fossil fuel technologies less economically viable for both producers and consumers, it creates a financial incentive to explore and adopt alternative, more environmentally friendly technologies.

This shift towards cleaner and more sustainable technologies can lead to advancements in renewable energy, energy efficiency, and other green solutions. Ultimately, this promotes innovation and supports the transition to a greener and more sustainable economy. Additionally, these taxes generate revenue for governments, enabling them to reduce other taxes and invest in environmental initiatives. Green taxes have several advantages. They incentivize individuals and corporations to adopt sustainable practices and reduce pollution, facilitating the transition to a renewable energy-driven green economy. Finland has successfully reduced its per capita carbon dioxide emissions over the years. Carbon taxes have become a significant and growing revenue source for governments globally, particularly in developing nations. In the European Union, the energy sector and transportation industry are the main contributors to green tax collections. The revenue generated from green taxes can be used to fund social welfare programs, with many countries utilizing the proceeds from carbon taxes to support initiatives aimed at assisting economically disadvantaged segments of society.

Figure 1(Source: OECD: Online)

ON WHAT ARE ENVIRONMENTAL TAXES APPLIED:

Green taxes are applied to various activities and industries that contribute to pollution. These include emissions from combustion vehicles, such as nitrogen monoxide (NO) and nitrogen dioxide (NO2). The combustion of petroleum and coal, which results in sulfur dioxide (SO2) emissions and contributes to acid rain, is another target of green taxes. Waste management practices, noise pollution from aircraft, and the use and combustion of energy products like petrol, diesel, natural gas, and coal, leading to carbon dioxide (CO2) emissions, are also subject to green taxes. Additionally, green taxes can be applied to address water pollution caused by pesticides, artificial fertilizers, and acidic substances. Activities involving earth manipulation and the extraction of natural resources are further areas targeted for green taxes. Lastly, the emission of CO2 and the use of ozone-depleting products, as well as transportation activities such as vehicle registration, usage, import, or sales, are also included in the scope of green taxes.

According to EU data, energy taxes always had the largest share among transport and pollution and resource use taxes.
By country and %GDP, Greece has the highest collection of environmental tax.
Countries like the United States generally have minimal or no carbon taxes in place, whereas in Sweden and Finland, carbon taxes serve as the primary source of green taxes.

This is used to absorb contaminants fromb polluted sites. It converts them into volatile compounds. Phytovolatilization uses plants for contaminants like mercury (Hg).

GREEN TAXES IN INDIA:

Green taxes in India have become increasingly important in balancing economic growth and environmental sustainability.

The Goods and Services Tax (GST) includes a specific cess on environmentally harmful products like coal, encouraging the use of cleaner alternatives. The Clean Energy Cess is imposed on coal extraction and production, with the revenue supporting renewable energy projects. The Swachh Bharat Cess funds sanitation and waste management initiatives. Additionally, a green tax on fossil fuel-based vehicles and reduced taxes on electric vehicles promote cleaner transportation and reduce carbon emissions.

DRAWBACKS OF GREEN TAXES:

The lack of standardized definitions for green taxes has led to inconsistent implementation practices, as seen in the varied approaches taken by different countries when implementing carbon taxes. For instance, while the United States emitted four times more CO2 than Sweden in 2016, it currently does not have a carbon tax in place. Developing countries like India and China face a complex challenge as they balance economic development with environmental concerns. Due to their reliance on coal as a primary energy source, green taxes in these countries often undergo compromises to avoid hindering industrial growth, resulting in diluted penalties for the industry. Green taxes can increase manufacturing costs, leading to higher product prices, as companies pass on the tax burden associated with fossil fuel reliance to customers. Such price hikes disproportionately affect individuals with lower incomes and can have a significant impact on social welfare initiatives. For example, Finland's carbon taxes have shown a net negative impact on its social welfare spending, with an estimated loss of approximately $3.5 billion if these taxes were applied to welfare programs.
Environmental taxation is widely recognized as a crucial factor in mitigating the effects of climate change.

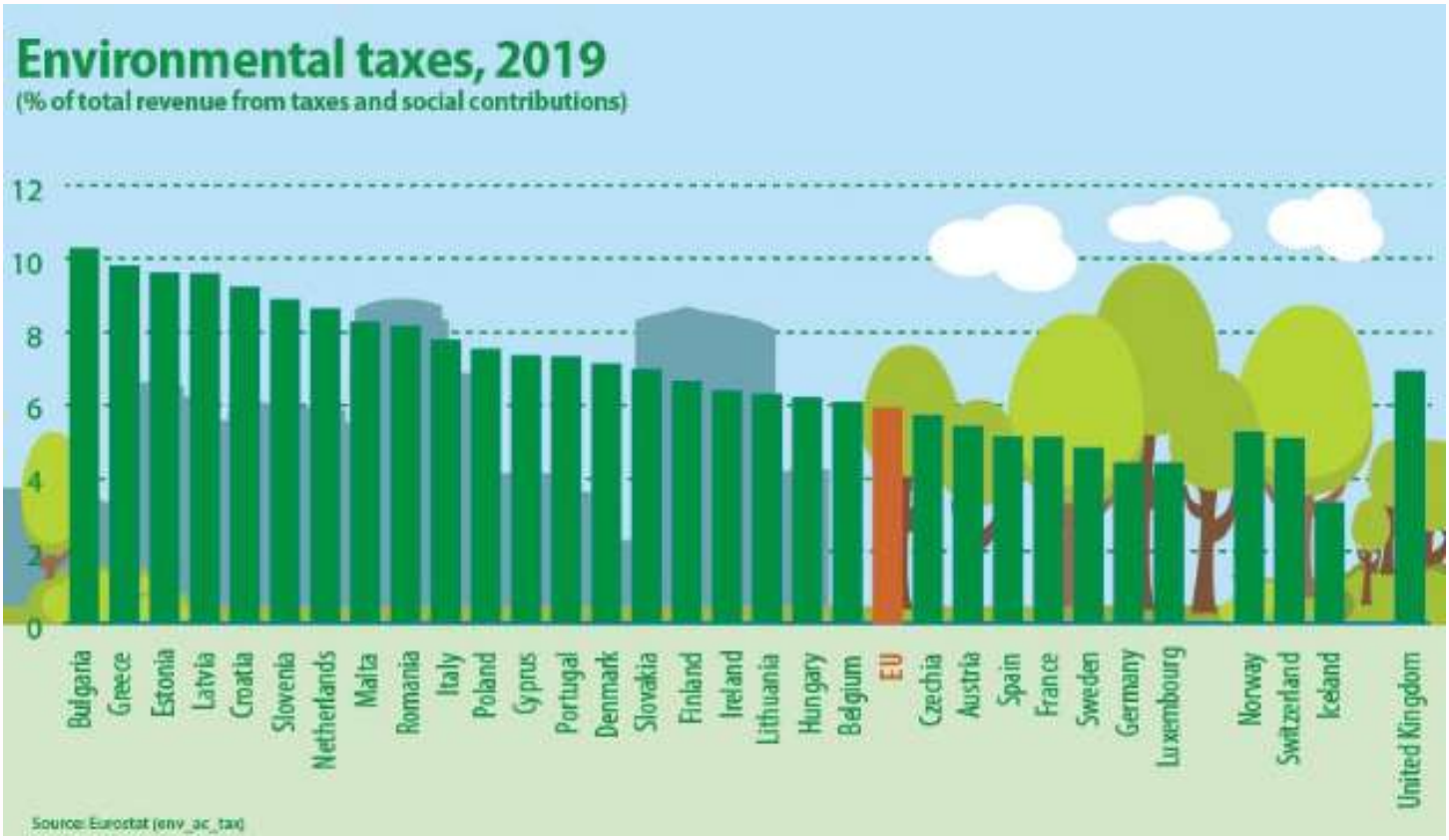

Figure 3 Environmental taxes (Source: EU_Eurostat: Online)

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INTERESTING FACTS

Fact 1: Cows 'destroy' the environment. Each cow can release between 200 and 400 pounds of methane gas through burps and farts each year. These levels are very high and are twenty-times more powerful than carbon dioxide gas.It has actually led a French company called Valorex SAS to try and convince farmers to feed their cows with alfalfa and flax seeds, which resulted in 25% less methane gas released through flatulence.

Fact 2: The earth has a lot of water. About 71% of the planet's surface constitutes water. The interesting this is that the amount of water is constant and is recycled throughout. It, therefore, means some of the water you drink today, at one point in the past may have passed through some of the extinct species or even a dinosaur!

Fact 3: Humans use only 1% of all available water. As already mentioned, about 71% of the earth is water. The oceans hold approximately 96.5% of all the water on earth, and the ice caps hold about 2%. The remaining exists in rivers, ponds, glaciers, ice caps, lakes, as water vapor and our taps, among other water bodies. Interestingly, only 1% of all that water can be used by human beings

POTENTIAL SOURCES OF CLEAN ENERGY

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GREEN TAXES IN INDIA:

As humans, we prefer to categorise things as good or bad, difficult or simple, rich or poor, stupid or brilliant. The same may be said about how people perceive various energy sources, such as renewable energy against traditional energy, green power versus brown power, clean energy versus dirty energy. Such perfect binaries, however, do not exist, and the clean energy / "dirty" energy dichotomy is no exception.

When you think of clean energy, you typically think of renewable energy sources such as solar and wind — and you'd be right! If you wrote nuclear energy on an exam, you'd also earn a checkmark. However, depending on who's grading, you'd probably receive half credit if you pencilled in natural gas, because there's a controversy about whether fossil fuels can truly be clean?

Clean energy, according to Chariot Energy, is synonymous with renewable energy — energy that does not emit greenhouse gases or other pollutants.

Others argue that nuclear energy, natural gas, and even clean-burning coal are on the greener side of the spectrum. In this article, we discuss the various forms of clean energy, such as nuclear and natural gas, and why we feel "clean" should be synonymous with "renewable." Clean energy is energy that comes from renewable, zero emission sources that do not pollute the atmosphere when used, as well as energy saved by energy efficiency measures. There is some overlap between clean energy and green or renewable energy sources, but they are not identical. To grasp the distinction, it is necessary to first understand what it signifies.

What Does Clean Energy Mean?

Clean energy is obtained from sources that do not emit air pollutants, whereas green energy is obtained from natural sources. Even though they are sometimes referred to as the same, there is a small distinction between these two energy kinds. Renewable energy is power generated from sources that are constantly being replenished. These renewable energy resources won't run out, unlike fossil fuels and gas, and include wind and solar energy

While the majority of green energy sources are renewable, not all renewable energy sources are considered green. Hydropower, for example, is a renewable resource, but some claim that it is not green because the deforestation and industrialization associated with the construction of hydro dams can harm the environment.

Green energy meets renewable energy, such as solar and wind energy, to create the ideal clean energy balance.

The following is a simple approach to recall the distinctions between these several sources of energy:

- Clean energy equals clean air.
- Green energy comes from natural sources.
- Renewable energy comes from recyclable sources.

How Does it Work?

Clean energy generates electricity without negatively impacting the environment, such as the release of greenhouse gases like carbon dioxide. Wind power, some hydro resources, and solar energy generation are all examples of clean energy that is also renewable.

Why is it Important?

The environmental benefits of clean energy are the most crucial feature of a global energy future. While clean, renewable energy help to maintain the world's natural resources, they also lessen the likelihood of environmental disasters like fuel spills and natural gas leaks. It is feasible to develop stable power supplies to boost energy security, ensuring there is enough to meet our demands, through fuel diversification, which involves diverse power plants employing different energy sources.

Benefits

Clean energy has numerous environmental and economic benefits, including reduced air pollution. A varied clean energy supply also decreases reliance on imported fuels (and the resulting financial and environmental consequences).

Renewable clean energy also saves money because there is no need to collect and transport fuels like oil or coal because the resources replenish themselves spontaneously.

Another industrial advantage of a clean energy mix is the development of jobs to develop, manufacture, and install future clean energy resources.

How Can We Get Clean Energy?

Clean energy can be obtained from a variety of sources which, when put together, could create solutions for all of our energy needs.

- Sunlight is the most plentiful and freely available energy resource on the world; in fact, the quantity of solar energy that reaches the Earth in one hour is sufficient to supply the planet's overall energy requirements for an entire year. Solar power is, of course, restricted by the time of day, the seasons, and geographical location. Despite this, solar energy is already being employed on a large and residential scale.
- Wind power is another abundant source of sustainable energy, with wind farms contributing significantly to electricity generation in the UK and abroad. While domestic 'off grid' wind energy is currently accessible, not every home is appropriate for a wind turbine.
- Water power is one of the most commercially developed renewable energy sources. This energy source is considered more reliable than wind or solar power, and it also provides for easy storage of generated energy so that it may be used as needed. Municipal hydropower is also being researched, which means that in the future, we may all be generating electricity by running water through pipes in our homes. Tidal power is a large-scale variant of hydro power that, while not a continual source of energy, is very predictable and reliable.
- Geothermal energy, unlike water, solar, and wind energy, is not derived from the sun. It is instead energy in the form of heat from the Earth. Geothermal energy is most commonly utilised to heat and cool people's houses.

- The Earth's heat energy is used to boil water and create steam to generate geothermal electricity. This steam then turns turbines, which provide electricity. It's comparable to a coal-fired power plant, but instead of burning fossil fuels, it runs on the heat of the Earth.
- To generate electricity, biomass employs solid fuel derived from plant components. Although this energy source still requires the combustion of organic materials, it is no longer wood and is considerably cleaner and more energy efficient than in the past. Using agricultural, industrial, and household waste as solid, liquid, and petrol fuel provides both economic and environmental benefits.

Is Clean Energy Really Clean?

By definition, all clean energy sources are 'clean,' but not all renewable energy sources are. For example, while burning wood from sustainably managed forests is renewable, it is not clean because it emits carbon dioxide into the environment.

To be completely clean, the carbon cost of production and storage must be zero, which is why sources such as solar power and wind energy are regarded as truly clean and renewable

The Future of Clean Energy

Clean energy has a promising future, with recent data showing that more renewable energy capacity has been added globally than new fossil fuel and nuclear capacity combined. Renewable energy sources now account for more than one-third of all installed power capacity worldwide. As an illustration of this expansion, the UK will be powered entirely by renewable energy for the first time on Wednesday, June 10, 2020.

As the world's population grows, so does the demand for energy, and renewable sources are the answer to delivering sustainable energy solutions while also safeguarding the globe from climate change.

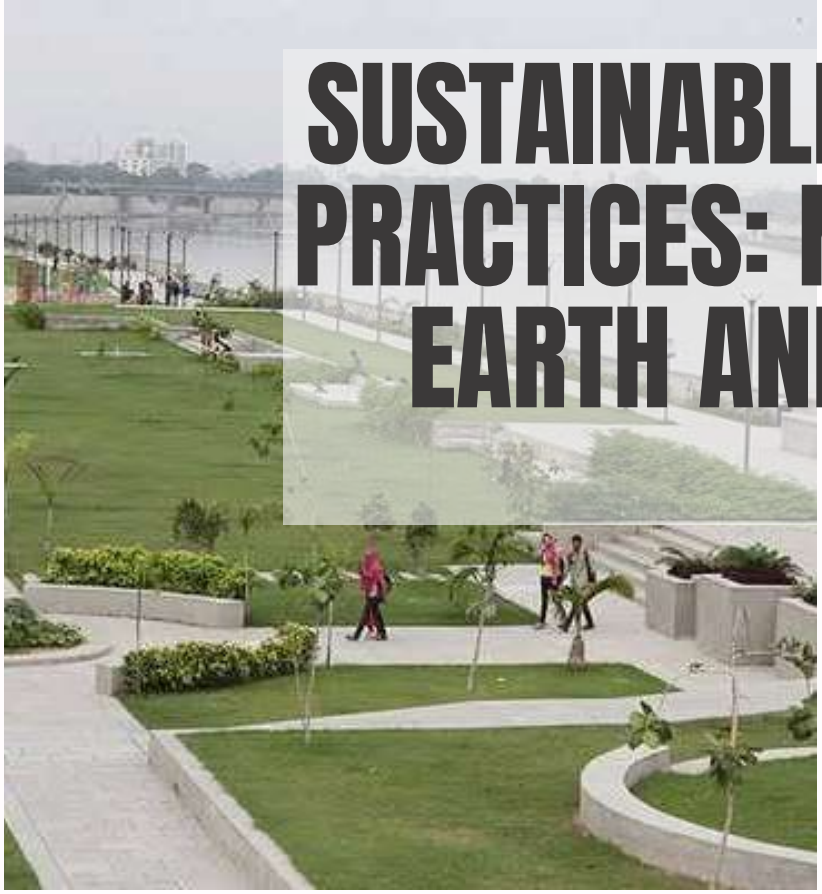
Clean energy adoption is not simply happening on a national scale; localities and states are also developing legislation to encourage renewable energy use. In the United States, 29 states have established renewable energy portfolios that require a particular percentage of energy consumption to originate from renewable sources, and over 100 cities across the world now use at least 70% renewable energy. As more cities strive to become 100% renewable, corporations are also playing a role by purchasing record amounts of renewable energy.

Of course, due to fossil fuels being a finite resource, it makes sense that the future is renewable and so it is expected that renewable sources will continue to increase in number, driving down the cost too.

Conclusion

Clean energy appears to be the future for humanity's power needs around the world, as reliance on fossil fuels continues to decline. As the push for clean, green, and renewable energy increases, the cost will come down and more jobs will be created to develop and implement these new power solutions.

More and more people are realising the environmental, societal, and economic benefits of clean energy, and this trend will continue as more towns, states, and nations sign on to a green power agenda.



SUSTAINABLE AGRICULTURE PRACTICES: NURTURING THE EARTH AND FEEDING THE WORLD

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In an era of growing population and increasing environmental concerns, following sustainable agriculture practices has become more crucial than ever. The traditional methods of farming, which relied heavily on synthetic fertilizers and pesticides, have had detrimental effects on the environment, degrading soil quality, polluting water sources, and contributing to greenhouse gas emissions. However by adopting sustainable agricultural practices we can nurture the earth while ensuring food security for future generations.

Sustainable agriculture encompasses a range of practices that promote long-term ecological balance and prioritize environmental stewardship. These practices include organic farming, agroforestry, conservation tillage, crop rotation, and integrated pest management. By implementing these practices, farmers stand to reap numerous benefits. Sustainable agriculture helps protect biodiversity by preserving natural habitats and minimizing the use of harmful chemicals. It promotes soil health and fertility through the use of organic matter, cover cropping, and natural fertilizers, reducing soil erosion and increasing water retention. Additionally, sustainable agriculture practices reduce greenhouse gas emissions, contributing to the fight against climate change. practices may require an initial investment, they can lead to cost savings in the long run. For instance, by reducing the reliance on synthetic inputs, farmers can lower production costs. And sustainable practices often improve crop yields, enhance soil quality, and increase resilience to pests and diseases, leading to greater economic stability for farmers.

Sustainable agriculture practices prioritize the well-being of farmers and local communities. By reducing chemical usage, these practices improve the health and safety of farmworkers. They also promote sustainable livelihoods by fostering local food systems and supporting

small-scale farmers. Moreover, sustainable agriculture practices encourage knowledge sharing and community engagement, strengthening the social fabric of rural areas. While the benefits of sustainable agriculture practices are evident, their widespread implementation faces several challenges.

One of the primary obstacles is the resistance to change within the agricultural sector as many farmers are accustomed to conventional farming methods and may be hesitant to adopt new practices due to concerns about potential financial risks, lack of knowledge, or limited access to resources and support.

Overcoming these barriers requires targeted educational programs, financial incentives, and the dissemination of success stories to showcase the advantages of sustainable agriculture. Another challenge lies in the complexity of transitioning from conventional to sustainable practices. It requires a shift in mindset, as well as the acquisition of new skills and knowledge. Farmers need guidance and training on techniques such as organic farming, integrated pest management, and soil conservation. Additionally, access to affordable and high-quality organic inputs, such as fertilizers and seeds, is crucial for the successful implementation of sustainable practices. Furthermore, scaling up sustainable agriculture practices to meet the demands of a growing population poses a significant challenge. It requires coordination between stakeholders, including farmers, governments, NGOs, and researchers. Collaboration is needed to develop and disseminate best practices, establish supportive policies, and build sustainable supply chains that connect farmers with markets.

One noteworthy example of the positive impact of sustainable agriculture can be seen in India. Before the Green Revolution in the 1960s, traditional farming practices prevailed, characterized by low yields and heavy reliance on chemical inputs. However, the excessive use of synthetic fertilizers and pesticides led to soil degradation, water contamination, and negative health effects. Recognizing the need for change, India has gradually shifted towards sustainable agriculture practices in recent years. Through government initiatives and farmer education programs, organic farming, integrated pest management, and conservation agriculture techniques have gained momentum.

The results have been impressive. According to a study by the Indian Council of Agricultural Research, sustainable agricultural practices have led to a 20% increase in crop yields, improved soil health, reduced chemical usage, and increased farmer incomes.

The future of agriculture lies in sustainable practices. Research conducted by the United Nations Food and Agriculture Organization suggests that sustainable agriculture practices have the potential to increase global food production by 20% while reducing agriculture's environmental footprint. As we face the challenges of climate change, the adoption of sustainable agricultural practices is crucial for ensuring food security and preserving the planet for future generations. And to secure said future we need to further promote sustainable agriculture by continuously investing in research and aiding the innovations of this field. Scientists are actively exploring various methods such as precision agriculture, agroecology, and vertical farming to enhance sustainability in food production. By integrating technology, biodiversity, and resource efficiency, these approaches aim to optimize yields while minimizing the environmental impact associated with agricultural practices. It is crucial to prioritize these initiatives to foster a resilient and sustainable food system for generations to come.

As we note that sustainable agriculture practices offer a holistic approach to farming that takes into account the health of the environment, society, and economy and by adopting these practices we not only protect biodiversity, improve soil health, reduce greenhouse gas emissions but also enhance the resilience of our agricultural systems. The case study of India's agricultural transformation clearly highlights the positive outcomes that can be achieved through implementing these sustainable practices.

As we move forward, it is vital to continue investing in research, education, and policy support to ensure the widespread adoption of sustainable agricultural practices worldwide.

IMPACT OF CLIMATE CHANGE ON TRIBAL COMMUNITIES IN INDIA-

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“Climate change affects us all, but it does not affect us all equally. The poorest and most vulnerable – those who have done the least to contribute to global warming – are bearing the brunt of the impact today.” (UN Secretary General Ban Ki-Moon)

Climate change is one of the greatest threats to environment and ecology today. Yet its blatant challenges to a country's human rights, security, and economic development are less discussed. Simply put, climate change refers to unpredictable weather patterns, rising sea levels, and other catastrophic events. It is associated with human activities and greenhouse gas (GHG) emissions that contribute to global warming. Developing countries with fast industrial growth and increasing carbon emissions are more threatened by effects of climate change.

India, one of the most populous countries in the world, is very vulnerable to the effects of climate change that pose significant challenges to the country's ecology, economy and society. Although climate change affects all communities, indigenous peoples are among the first and hardest hit as they are closest to the nature even when they have no to very less contribution in global warming. Indigenous peoples of India make up an estimated 104 million (or 8.6%) of the country's population (according to the 2011 Census report). There are 705 officially recognized ethnic groups, but there are many more that are not officially recognized, although they are eligible to be proposed as a tribe. Therefore, the total number of tribal groups in the country is likely higher than the official number. The highest concentration of tribal peoples is in his seven states in northeastern India, with the so-called "Central Tribal Belt" stretching from Rajasthan in the west of the country to West Bengal in the east. It is vital to highlight that the dangers that climate change postures for indigenous people groups contrast from the dangers that it postures for other bunches in society, counting the poor. Hundreds of millions of indigenous men and women around the world manage their forests and cultures, making a sustainable contribution to sequestering and capturing greenhouse gases from the global atmosphere.

However, in many parts of the world, tribal and indigenous people tend to struggle to preserve their natural and ecological resources from deforestation and destructive mining of minerals, energy and resources. , oil and gas, etc. through mining. Indigenous communities are advocating in many local, regional and international discussion forums for the maintenance of sustainable systems of production and consumption, and this effort is perhaps more necessary than ever.

The phenomena of climate change disrupts agricultural cycles, degrade land quality, and deplete water sources, causing reduced crop yields, food scarcity, and increased vulnerability to poverty and malnutrition. As a consequence of climate change impacts, tribal communities are often forced to leave their ancestral lands due to rising sea levels, coastal erosion, and changing ecological conditions. Displacement leads to a loss of cultural identity, disconnection from traditional practices, and challenges in adapting to new environments. Moreover, indigenous people face land grabbing and exploitation as they seek refuge in unfamiliar territories.

Climate change also amplifies health risks for tribal communities, who already face limited access to healthcare services. Changing climate patterns contribute to the spread of vector-borne diseases, such as malaria and dengue, affecting indigenous populations disproportionately. Extreme temperatures and heatwaves pose significant health hazards, particularly for the elderly and children, who are more vulnerable to heat-related illnesses. Inadequate healthcare infrastructure and resources exacerbate these challenges, further compromising the well-being of tribal people.

These factors have direct impact on mental health, social capital, food security, water supply, sanitation, infectious diseases, injury, and health care access.

One report found that indigenous peoples share six characteristics that make them particularly vulnerable to the direct effects of climate change; the destructive effects on the environment leading to climate change, and mitigation and adaptation measures.

First, indigenous peoples are among the poorest of the poor, the most vulnerable group to climate change. Second, they depend on renewable natural resources most threatened by climate variability and extremes of their economic activities and livelihoods. Third, they live in the geographic areas and ecosystems most vulnerable to the effects of climate change, and share a complex cultural relationship with these ecosystems. Fourth, high level exposure and vulnerability to climate change forces as indigenous peoples migrate a lot that leads to exacerbate economic and social vulnerabilities.

Fifth, gender inequality, Climate change threatens to increase the vulnerabilities of Indigenous women to discrimination, exclusion and exploitation, while also creating new risks from climate change impacts. Sixth, and finally, many indigenous communities continue to face excluded from decision-making processes, often without institutional recognition and support.

This limits their access to remedies, increases their vulnerability to climate change, weakens their ability to mitigate and adapt to climate change, and thus pose a threat to progress made in securing their rights.

However, many indigenous tribes are using their own traditional practices and expertise to resist the effects of climate change. Over generations, these people have acquired a fundamental understanding of the relationship between human-environment interactions and the impact of the environment on human health and well-being.

This traditional ecological knowledge provides tribal communities with a holistic view of the impacts of climate change and a unique approach to interpreting climate science. And that knowledge is an essential resource for predicting the impacts of climate change and developing adaptive responses in tribal communities, such as identifying food substitutes and adapting hunting and fishing cycles and practices.

Therefore, the impacts of climate change on Indian tribal communities are severe and diverse, threatening tribal livelihoods, cultural heritage and general well-being. It is important to recognize their unique vulnerabilities and actively engage in mitigation and adaptation measures. Policy makers, researchers and civil society work together to strengthen tribal communities, protect tribal rights, preserve traditional knowledge and build resilience in the face of an uncertain future. is needed. Only through concerted efforts can we foster a more inclusive and sustainable future for all.

Additional Reading

The environment around us is full of amazing features and facts you might not know. One of the best ways to appreciate the earth around us is to learn more about how we interact with nature. Here are some cool environmental facts you might not know:

1. Around 27,000 trees are cut down each day
The world has over 3.04 trillion trees in the world. However, 27,000 of them are cut down daily to make toilet paper. This translates to about 9.8 million trees annually. One single recycled edition of the New York Times newspaper could save 75,000 tree

2. Humans use only 1% of all available water
About 71% of the earth is water. The oceans hold approximately 96.5% of this water and the ice caps hold about 2%. The remaining water exists in rivers, ponds, glaciers, ice caps, lakes, as water vapor and our taps, among other water bodies. Only 1% of the earth's water is safe for human consumption.

3. 78% of marine mammals are at risk of choking on plastic
Seventy-eight percent of marine mammals are at risk of accidental deaths, such as getting caught in fishing nets. Plastic bags and other plastic garbage that ends up in the ocean kill over 1,000,000 sea animals every year.

4. Americans throw away 25 trillion Styrofoam cups every year
Styrofoam is not biodegradable. Switching to single use options will help cut down on Styrofoam pollution.

5. Fungi play a highly vital role in the environment
Fungi play a protective role in the environment. From digesting minerals out of rock formations to consuming fossil fuel spills, and even de-radiating the environment

6. Ants weigh more than humans
The combined weight of ants on the planet is higher than all human beings. The world has over 7 billion people, and 100 trillion ants.

ACHIEVING NET-ZERO EMISSIONS: INDIA'S PATH TOWARDS SUSTAINABILITY

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The global community is facing an urgent need to address climate change and transition towards a sustainable future. Achieving net-zero emissions is a critical goal, aiming to balance greenhouse gas emissions with removal or offsetting measures. This article explores India's efforts in achieving net-zero emissions, highlighting key initiatives, challenges, and potential solutions.

India's Emission Landscape:

India is the world's third-largest emitter of greenhouse gases, primarily driven by its rapidly growing population, industrialization, and increasing energy demands. The country heavily relies on coal for energy generation, leading to substantial emissions. However, India has also taken significant steps towards renewable energy adoption and sustainability.

Renewable Energy Transition:

To combat climate change, India has embarked on an ambitious renewable energy transition. The country aims to achieve 450 GW of renewable energy

Image Source: News18

capacity by 2030, including solar, wind, hydro, and bioenergy. This includes scaling up solar energy installations, enhancing wind power generation, and investing in grid infrastructure to enable smooth integration of renewable sources.

Energy Efficiency Measures:

India recognizes the importance of energy efficiency in reducing emissions. The government has implemented various initiatives to improve energy efficiency across sectors such as buildings, transportation, and industries. These measures include promoting energy-efficient appliances, implementing building codes, and adopting energy-efficient industrial processes

Image Source: https://shorturl.at/anDJ2

Electric Mobility Revolution:

India is witnessing a rapid shift towards electric mobility to reduce emissions from the transportation sector, which is a significant contributor to air pollution and greenhouse gas emissions. The government has introduced several incentives, subsidies, and policy measures to promote the adoption of electric vehicles (EVs). Additionally, the development of charging infrastructure and battery technology is crucial for a successful electric mobility transition.

Cleaner Industrial Practices:

India's industrial sector plays a vital role in the country's economic growth but also contributes significantly to emissions. To mitigate this impact, the government is promoting cleaner and more sustainable industrial practices. Encouraging the adoption of cleaner technologies, investing in research and development, and imposing stricter environmental regulations are key strategies for achieving emissions reductions in the industrial sector.

Forest Conservation and Restoration:

India recognizes the importance of forests in sequestering carbon dioxide and preserving biodiversity. The country has initiated various afforestation and reforestation programs to increase forest cover, including the ambitious goal of achieving a net-zero emissions forestry sector by 2030. Protecting and restoring ecosystems and promoting sustainable land management practices are crucial for achieving net-zero emissions.

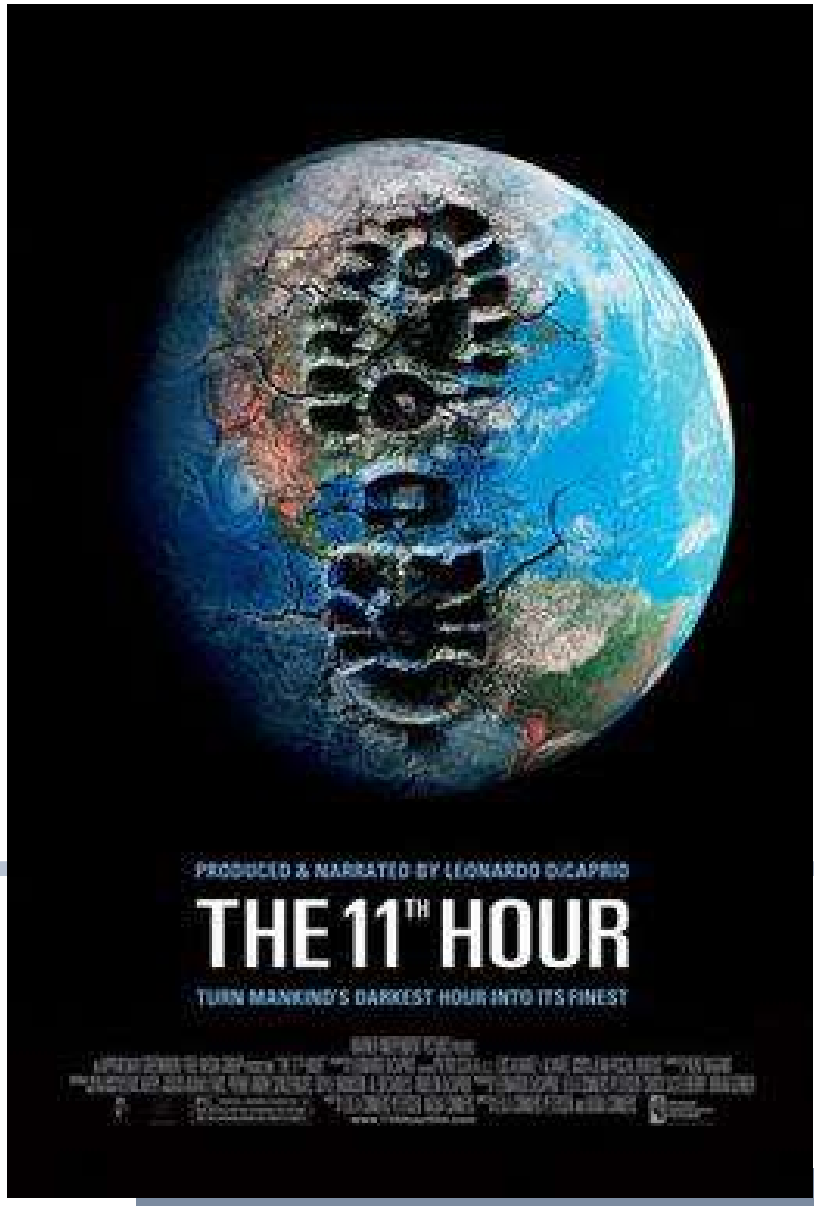
Challenges and Way Forward:

While India's commitment towards achieving net-zero emissions is commendable, several challenges must be addressed. These challenges include the heavy reliance on coal, the need for massive investments in renewable infrastructure, technological barriers, and social and economic considerations. Collaboration between the government, private sector, civil society, and international partnerships will be crucial in overcoming these challenges.

In conclusion, Emission mitigation is a crucial policy ideal for policymakers in India and the world. India is actively working towards achieving net-zero emissions by implementing various strategies and initiatives.

MOVIE RECOMMENDATION

THE 11TH HOUR (2007)



The 11th Hour is a 2007 documentary film on the state of the natural environment created, produced, co-written and narrated by Leonardo DiCaprio. It was directed by Leila Conners Petersen and Nadia Conners and financed by Adam Lewis and Pierre André Senizergues, and distributed by Warner Independent Pictures.

Its world premiere was at the 2007 60th Annual Cannes Film Festival (May 16–27, 2007) and it was released on August 17, 2007, in the year in which the Fourth Assessment Report of the United Nations global warming panel IPCC was published and about a year after Al Gore's An Inconvenient Truth, another film documentary about global warming.

Synopsis

With contributions from over 50 politicians, scientists, and environmental activists, including former Soviet leader Mikhail Gorbachev, physicist Stephen Hawking, Nobel Prize winner Wangari Maathai, journalist Armand Betscher, and Paul Hawken, the film documents the grave problems facing the planet's life systems. Global warming, deforestation, mass species extinction, and depletion of the oceans' habitats are all addressed. The film's premise is that the future of humanity is in jeopardy.

The film proposes potential solutions to these problems by calling for restorative action by the reshaping and rethinking of global human activity through technology, social responsibility and conservation.

SOURCE:-HTTPS://EN.WIKIPEDIA.ORG/WIKI/

Whispers IN the Woods

In woodlands deep, a sorrow unspoken,
Whispers in the wood, a lament awoken.
Once stood proud, the giants so grand,
Now fallen, scattered across the land.

Their emerald crowns graced the sky,
Now stumps and shadows catch the eye.
The symphony of life, now but a sigh,
In the silence, nature's tears run dry.

Creatures of the forest, displaced and lost,
Their homes shattered, at a great cost.
The balance disrupted, an ecosystem weeps,
Yearning for the healing that nature seeks.

"Whispers in the Wood" plead for a change,
A chance to restore, to rearrange.
Let our hearts be moved, our spirits stirred,
To protect the forests, their every word.

Reforestation's embrace, a path to mend,
Planting hope and watching it ascend.
Together, we can heal, nurture and sow,
For the whispers to flourish, to again glow.

In the arms of nature, unity prevails,
As we cherish the woods, where beauty exhales.
With love as our guide, and respect as our creed,
Let "Whispers in the Wood" be our urgent need.

Half the size, but still filled with the plea,
To save the forests, for all to see.
Let us be the guardians, brave and strong,
Preserving nature's legacy, righting the wrong.

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WORLS'S LARGEST CARBON EMITTER COUNTRY

China is currently the world's largest carbon emitter. As the most populous country with a rapidly growing economy, China's carbon emissions have risen significantly over the past few decades. The country heavily relies on coal for its energy needs, which is a major contributor to carbon dioxide emissions.

China's industrial sector, including manufacturing and construction, has been a significant driver of its carbon emissions. The country's rapid urbanization and infrastructure development have led to increased energy consumption and a higher demand for fossil fuels. Additionally, China is also the largest producer and consumer of coal, which further contributes to its carbon emissions.

In recent years, China has taken steps to address its carbon emissions and combat climate change. The government has implemented various policies and initiatives to promote renewable energy sources, such as wind and solar power. China has become a global leader in renewable energy capacity, investing heavily in these technologies to reduce its reliance on coal.

Furthermore, China has set ambitious targets to peak its carbon emissions by 2030 and achieve carbon neutrality by 2060. The country aims to increase the share of non-fossil fuels in its energy mix and improve energy efficiency in industries and transportation.

Given China's size, population, and economic growth, its efforts to reduce carbon emissions are crucial for global climate action. The country's transition to cleaner energy sources and its commitment to long-term climate goals will play a significant role in addressing the challenges of climate change on a global scale.

MAGAZINE TEAM

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