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EARTH ROOT

Volume 31
DECEMBER,2023

“THERE MUST BE A BETTER WAY TO MAKE THE THINGS WE WANT, A WAY THAT DOESN’T SPOIL THE SKY, OR THE RAIN OR THE LAND.”
- PAUL MCCARTNEY

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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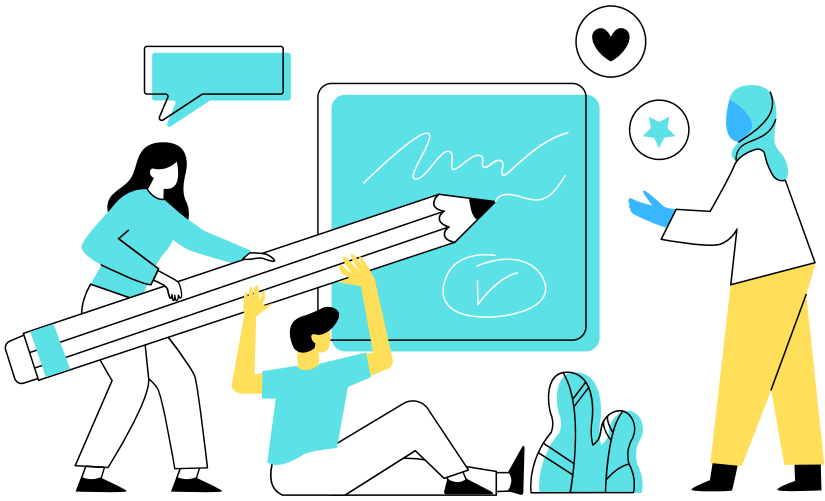

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BIODIVERSITY SOS: UNRAVELING THE CRISIS AND CHARTING A SUSTAINABLE COURSE

Sanya Sharma,
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University of Delhi, New Delhi

One of the most amazing things about our natural world is the diversity of life that exists in it. The term “biodiversity” refers to the variety of living organisms, their genetic differences, and each species’ relationship to one another. Biodiversity is often called the “web of life” because it shows how all the species work together to support life and ecological balance on Earth. Today, our modern lives and patterns of overconsumption are putting a strain on the planet’s natural resources. Aside from climate change, biodiversity loss is another huge issue we have to tackle. According to the WWF’s Living Planet Report 2022, since 1970, 69% of our planet’s wildlife population has been lost due to land-use change, over-harvesting, habitat fragmentation, invasive species, and pollution.

In 2017, scientists declared a "biological annihilation," signaling the Earth's potential entry into its sixth mass extinction event. With between 5.3 million and one trillion species on Earth, human activities, though constituting only 0.01% of the planet's life, are jeopardizing its health. The consequences of biodiversity loss extend beyond the extinction of rare species, directly affecting humans.

There are between 5.3 million and one trillion species on Earth and while humans just make up 0.01% of the planet’s life, their activities are compromising its health and killing millions of animals and plants every year. Biodiversity loss is happening at an extremely wide scale and, if left unchecked, it can have devastating social, economic, and environmental consequences. What are the benefits of biodiversity and why is it so important to protect it?

Understanding the vital role of biodiversity in human life reveals its multifaceted benefits:

1. **Disease Resistance**

Genetically diverse populations have better chances of surviving a catastrophe like a pandemic. Diverse populations carry genetic codes that make certain members of their group less vulnerable. When those carrying these genetic codes reproduce, disease resistance is passed along and the species’ survival is ensured.

2. **Carbon Sequestration**

Carbon sequestration is the process of capturing and storing carbon dioxide from the atmosphere. It reduces atmospheric carbon dioxide and its ultimate goal is to reduce climate change. Vegetation and soil in ecosystems like forests, peatlands, grasslands, seabeds, wetlands, and kelp beds act as carbon sinks, removing carbon dioxide from the atmosphere.

3. **Storm, Flooding, and Coastal Erosion Regulation**

Coastal sea levels are rising and the World Economic Forum says that as many as 410 million people could be affected by the end of the century. While 59% of sea level rise is expected to be in tropical Asia, countries such as China, France, Senegal, Nigeria, and the United States are also at risk. Restoration and protection of coastal ecosystems such as salt marshes and mudflats will be an important aspect of flood prevention for low-lying coastal communities. Saltmarsh plants and microbes stabilise and bind soil together. Coupled with greater root biomass, these ecosystems can provide better resistance to soil erosion.

Ecosystems like coral reefs, seagrass, and soft-bottom ecosystems work as buffers against waves or storms, protecting coastal communities that are prone to typhoons.

4. **Food Security**

Our food system and agriculture are strongly linked to biodiversity. Millions of species work together to supply us with a variety of grains, vegetables, fruits, and animal products. Food production relies on many “services” that biodiversity provides. This includes pollination, maintenance of soil fertility, resistance to pests and diseases, climate maintenance, and water filtration.

5. **Overall Health and Happiness**

Whether it is strolling in a park in the city, going to the mountains, or swimming in the sea, being in contact with nature has a host of benefits for humans. Exposure to green and blue spaces outdoors improves our working memory, attention control, and cognitive flexibility. Researchers also found that aside from cognitive improvements, contact with nature is associated with increased positive social interactions, happiness, having a sense of meaning in life, as well as decreases in mental stress.

CONSERVATION

Biodiversity conservation covers a wide range of activities that can be done. Protecting habitats is an extremely important biodiversity conservation activity; done by identifying the habitats facing threats and eliminating these threats in order to maintain the natural area. This also comes in the form of leaving wildlife undisturbed, especially nesting and denning areas, and wildlife habitats can be promoted by setting up man-made bird and bat houses. Limiting and modifying agricultural activities also falls into the category of biodiversity conservation. This can be done by conserving water in wetlands and reducing irrigation, and by managing livestock grazing through maintaining good quality range conditions and leaving areas ungrazed.

Replacing resource-intensive products damaging to biodiversity requires embracing sustainable alternatives. Lab-grown meat and microalgae as a palm oil alternative exemplify this shift. Lab-grown meat, cultivated through innovative processes, presents a solution to traditional meat production challenges. Similarly, microalgae provides a sustainable substitute for palm oil in various consumer products. Overfishing poses a significant threat to marine ecosystems. Vertical ocean farming, championed by GreenWave, offers a restorative solution. Described as an 'underwater garden,' this method mimics natural habitats, growing kelp, mussels, scallops, and oysters. These farms reduce the need for destructive trawling, providing food for diverse marine life while minimizing environmental impact.

In the End.....

Biodiversity is like an insurance policy for the planet, protecting species and communities against sudden changes and stresses. Many conservation campaigns focus on saving individual species from extinction, but it’s important to remember that no organism exists in isolation. If a species is at risk, chances are that its ecosystem is in danger as well.

BEHIND THE LAB DOORS: UNDERSTANDING ANIMAL TESTING

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We often try to get the best possible products that are of good quality and economical as well. But what we often overlook is how they're being manufactured, how the scientists make sure that the product is suitable for human skin, how the products are being tested. Many people find animals as their companions and a source of comfort and happiness but on the flip side some people find them as a means of intensifying experimental research or advancing medical techniques. Animals are used in testing of many products like drugs, medical products, cosmetics, household products, etc. A very recent example of this is the testing of Covid-19 vaccines. When the people all around the world were sitting at home, hoping for a vaccine or an antibiotic to be made, and animals were trapped inside the cages in the labs on which the vaccines were being tested. Obviously, the humans get benefitted from the animal experimentation but the pain, suffering and death, the animals suffer is not worth the possible human benefits.

Animals and human beings are alike when it comes to feeling, thinking, behaving and experiencing pain. But animals are not given a choice when it comes to experimentation. They are exposed to tests that are too painful and can cause permanent damage or death. They scream in pain, suffer from frustration, long to be free from the cages, but, they don't get the right to be free.

All they can do is remain dreadful, until next torture is performed. Lack of environment they're used to and the stress of the situation they're stuck in causes neurotic disorders which makes them behave in a weird way, like spinning in circles, pulling their own fur, biting themselves and many more. Rats are made to inhale toxic fumes, dogs are made to feed on pesticides and corrosive chemicals are dripped in rabbits' eyes. Ironically, if a product is proved to be safe for animals, it however, never guarantees to be safe for humans.

Non-animal tests are available to replace animal testing, which is cruel, expensive, and violates animal rights. These alternatives include advanced computer modeling techniques, sophisticated tests using human cells and tissues, and research results from human volunteers. However, despite the availability of alternatives, animal testing continues, leading to the torture of animals. Increased awareness and education are needed to inform people about the products they use. Developing healthcare and quality of life for humans should not come at the expense of thousands of animal lives. Animals should be treated with respect and equality, like humans.

UNVEILING THE SIDE EFFECTS OF ARTIFICIAL RAIN

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Artificial rain, also known as cloud seeding, is a weather modification technique designed to enhance precipitation by dispersing substances into the air that serve as cloud condensation or ice nuclei. While this technology has been employed in various regions around the world to alleviate droughts or mitigate the impact of wildfires, concerns have been raised regarding its potential side effects on the environment, ecosystems, and human health. This article aims to provide a detailed analysis of the side effects associated with artificial rain.

Ecological Impact:

- Soil and Water Contamination: One of the primary concerns surrounding artificial rain is the potential for soil and water contamination. The substances used in cloud seeding, such as silver iodide or potassium iodide, may find their way into soil and water bodies, posing a risk to aquatic ecosystems and affecting the quality of drinking water.
- Disruption of Natural Water Cycles: Critics argue that artificial rain could disrupt natural water cycles and precipitation patterns. Altering the timing and distribution of rainfall may have unintended consequences on local ecosystems, including changes in plant and animal behavior, migration patterns, and overall biodiversity.

Agricultural Concerns:

- Crop Damage: The introduction of foreign substances into the atmosphere may have unintended consequences on crops. Some studies suggest that the use of cloud seeding agents could potentially damage crops, affecting agricultural productivity and food security.
- Altered Microclimates: Artificial rain has the potential to create microclimates, which may not be conducive to certain crops. Changes in temperature, humidity, and precipitation patterns could lead to the adaptation of crops to new environmental conditions, impacting the agricultural landscape.

Human Health:

- Respiratory Issues: The release of silver iodide particles into the atmosphere during cloud seeding has raised concerns about respiratory health. Inhalation of these particles may irritate the respiratory system, leading to respiratory issues, especially for individuals with pre-existing conditions such as asthma.

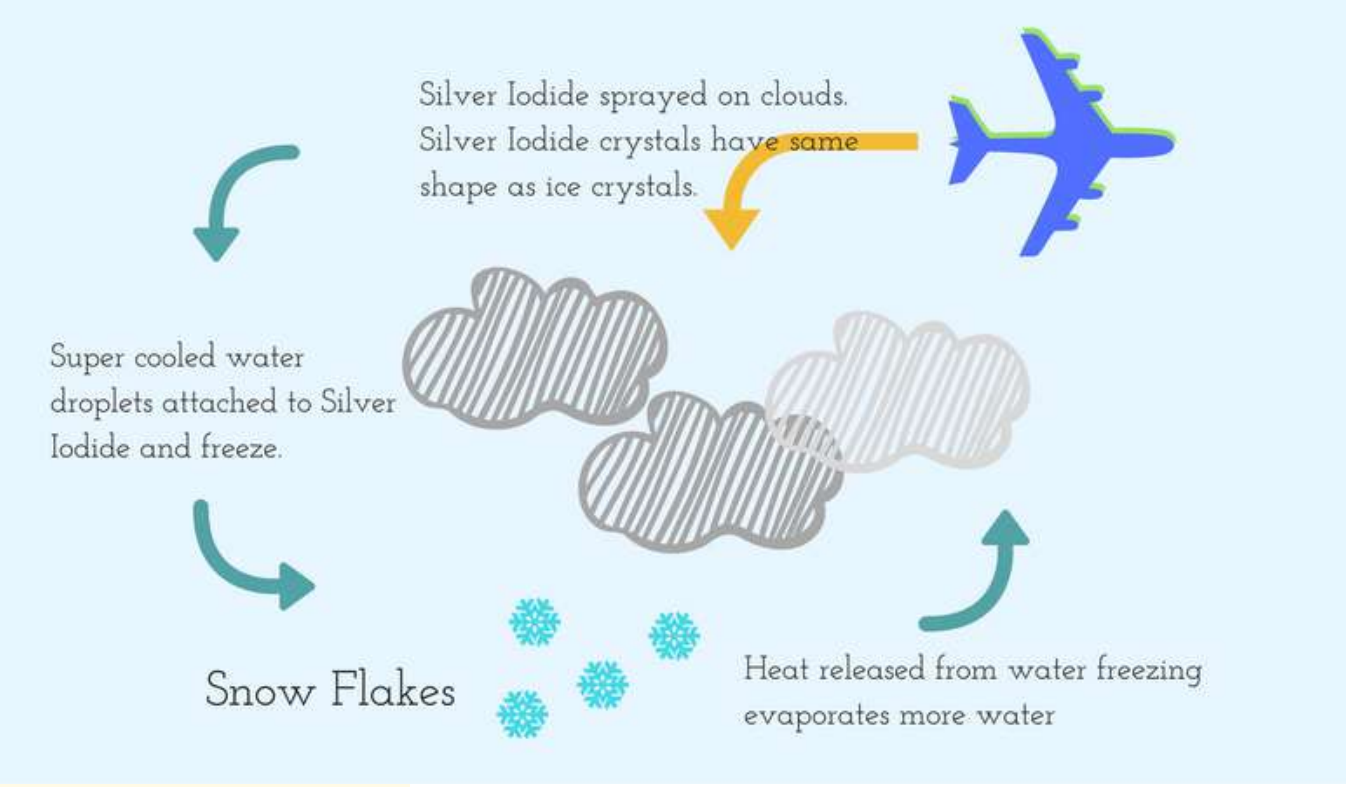
- Waterborne Contaminants: If cloud seeding agents make their way into water sources, there is a risk of waterborne contamination. This poses a potential threat to human health, as contaminated water can carry harmful substances that may lead to various health problems.

Climate Change Considerations:

- Unintended Climate Consequences: Artificial rain may have unintended consequences on regional and global climate patterns. Manipulating precipitation in one area could potentially lead to changes in atmospheric circulation, affecting weather systems beyond the targeted region.
- Ethical Concerns: The intentional modification of weather patterns raises ethical questions about humanity's role in shaping the environment. The long-term consequences of artificial rain on climate stability and global ecosystems are not fully understood, adding a layer of uncertainty to the ethical considerations.

While artificial rain has shown promise in addressing water scarcity issues in some regions, it is crucial to carefully consider and monitor the potential side effects associated with this technology. Striking a balance between harnessing the benefits of artificial rain and minimizing environmental and health risks requires ongoing research, transparent practices, and a comprehensive understanding of the complex interactions within Earth's ecosystems. Responsible deployment and continuous evaluation of artificial rain techniques are essential to ensure a sustainable and harmonious coexistence with the environment.

HOW ARTIFICIAL RAIN (CLOUD SEEDING) WORKS;



SOURCE:- HTTPS://WWW.STUDYTONIGHT.COM/

EFFECTS OF ENVIRONMENTAL DEGRADATION ON HUMAN DEVELOPMENT..

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The issue of environmental degradation has been present since the dawn of human civilization, yet for an extended period, environmental concerns were largely ignored. In 1972, the United Nations Conference on the Human Environment (UNCHD) held its first international meeting in Stockholm, during which an "Action Plan for Human Development" was established. The World Commission on Environment and Development (WCED) later advocated for the concept of "sustainable development" in a 1987 report, defining it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The Rio declaration on Environment and Development, held from 3 to 14 June 1992, provided further refinement of these concepts. As a result, environmental issues, once overlooked, have now become significant global concerns integrated into development strategies worldwide. Environmental issues that lead to degradation are multifaceted, with problem severity varying based on the specific issue. While some issues are local, others are global in nature. Climate change is an example of a global problem.

Environmental issues such as depletion of the ozone layer, loss of biodiversity, and extinction of endangered species are global in nature, necessitating international cooperation for their resolution. In contrast, problems like land degradation, water pollution, and vehicular and air pollution are local and require policies at the national and regional level. Environmental degradation arises primarily from the excessive extraction of natural resources, which is often deemed a means for development. This deterioration in environmental quality manifests in the form of ambient concentrations of pollutants and the effects of improper land use and natural disasters (OECD).The causes of environmental degradation are many, but it often results from the uncontrolled and rapid extraction of natural resources. The growing trends of industrialization, population growth, and economic development, along with unbridled urbanization, are the leading drivers of environmental degradation. This degradation can occur naturally or be caused by human activities, such as habitat destruction, biodiversity loss, or resource depletion. Ultimately, environmental degradation harms the environment and its inhabitants,

The need for sustainable development practices is emphasized, given the different levels of environmental degradation - local, regional, and global. Various social, economic, and institutional factors contribute to environmental degradation, including population growth, poverty, and urbanization. The Ministry of Environment and Forest (MOEF) bears the responsibility of protecting, conserving, and developing the environment in India. The Environment (Protection) Act, 1986, Forest (Conservation) Act, 1980, and the Wildlife (Protection) Act, 1972, are some of the critical pieces of legislation governing environmental management in India.

Both local and global environmental problems disproportionately affect poor people. Local environmental concerns, such as water pollution and contamination, air pollution, waste disposal, deforestation, and soil degradation, have a direct impact on human beings. Water and waste-related illnesses are increasing, with the poorest people being the most vulnerable. Water pollution and contamination, air pollution, domestic solid waste, industrial hazardous waste, soil degradation and desertification, deforestation, and loss of biodiversity, are some of the local environmental concerns that contribute to environmental degradation.

Water pollution and contamination affect people globally, but the most significant impact on human well-being is in developing countries, particularly in the poorest regions. About 29% and 43% of people in developing and underdeveloped countries, respectively, lack access to safe water, while 58% and 68% lack access to basic sanitation. Air pollution, caused by industrial emissions, vehicle exhausts, and fuel burning, causes over 2.7 million deaths every year. According to the World Health Organization (WHO), deaths from indoor and outdoor pollution in India are over 1000. Deaths from indoor pollution in rural areas are higher than in urban regions in India.The amount of domestic solid waste continues to increase, both in absolute terms and per capita.

In developing countries, up to half of the waste generated remains uncollected. The degradation of the environment is further exacerbated by industrial hazardous waste such as toxic effluents from mines, chemical manufacturers, pulp and paper plants, and leather-tanning factories. The Bhopal disaster in India is a prime example of the catastrophic effects of such waste, resulting in the deaths of over 8,000 individuals and further impacting the lives of over 50,000 more due to lethal gases from the Union Carbide factory.

Soil degradation and desertification are increasingly prevalent issues in Asia and Africa, disproportionately affecting the poor. According to the MA report, nearly one-third of the global population, primarily the poor, depend directly on their ability to grow, gather, or catch food.

Deforestation is one of the most significant factors contributing to environmental degradation, with one-third of the world's forests having disappeared, and two-thirds of what remains having been altered. Although India managed to increase its forested area by over six million hectares in the 1980s, the loss of biodiversity remains a significant concern. The erosion of biodiversity has severe ecological consequences, such as the decline of shrimp farming, leading to increased mangrove area loss. Table 1 shows the relationship between mangrove loss and shrimp production.

Table 1: Relationship between Mangrove Loss and Shrimp Production

Country	Mangrove area loss by 1989 (000 of hectares)	Shrimp production in 1995 (000 of tons)
Thailand	200	280
Ecuador	120	90
Viet Nam	67	37
India	35	96
Bangladesh	9	34

Source: Shiva 1997a

Environmental Degradation and Human Development

Miller stated on the consideration of the law of the Conservation as “matter cannot be created or destroyed; it can only be changed from one form to another. Every waste material we believe we have managed is still with us in one form or another; there is no away”**1** .

. In Ramcharitmanas**2** also described that chhiti, jal, pawak, gagan and sameer are the five fundamental elements from which our body is meant. In ancient Indian civilization and literature e.g. Vedas, Upanishads Smiritis and dharmas preach a worshipful attitude towards earth, sky, air, water, plants, trees, and animals and enshrine a respect for nature and environmental harmony and conservation. It regards sun, air, fire, river, earth and forests as god and goddesses**3** . Many animals, birds, trees and plants are associated with the names of gods and goddesses. This really shows the respect given to the civilization so that the human being respect the natural resources and don't degrade it. Under the auspices of the United Nations, the Millennium Ecosystem Assessment was conducted to assess the consequences of ecosystem change for human development and also to establish the action needed to enhance the conservation and sustainable use of ecosystems and their contribution to the human well-being on the scientific basis. Millennium Ecosystem Assessment (MA) finds four main findings.

These are as**4**

(a) Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on earth.

(b) The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of non-linear changes, and the exacerbation of poverty for some groups of people. These problems, unless addressed, will substantially diminish the benefits that future generations obtain from ecosystems.

(c) The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium development goals. (d) The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the Millennium Assessment considered, but these involve significant changes in policies, institutions, and practices that are not currently under way.From the above four findings it is evidently clear that how important role of human well-being with resource depletion or degradation. In Table 2 ecosystem services and constituent of wellbeing has been shown. In the figure it has been depicted the strength of linkages between the

The relationship between ecosystem services and human well-being is mediated by socioeconomic factors. The five dimensions of human well-being are basic material for a good life, freedom and choice, health, good social relations, and security. Ecosystem services consist of provisioning, regulating, and cultural services, as well as supporting services. Changes in these services affect human well-being, including its constituents. Freedom and choice also impact human well-being.

Refrences:-

1.Miller, T.G (1992), living in the environment, 7th edn (Belmont, CA: Wadsworth publishing Company).

2.Ramcharitmanas is most popular epic for Hindu religion which is written by Goswami Tulsidas. Tulsidas mentioned that human body is made from five element (earth, water, fire, cloud and air), but modern scientist acclaimed that these are not a single element.

3.Taken from Sankar, U (2009)

4. These four measures were taken from the Millennium Ecosystem Assessment (2005), Ecosystems and human well-being: synthesis, island press, Washington D.C.

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MOVIE
RECOMMENDATION

AN INCONVENIENT TRUTH/(2006)

Filmmaker Davis Guggenheim follows Al Gore on the lecture circuit, as the former presidential candidate campaigns to raise public awareness of the dangers of global warming and calls for immediate action to curb its destructive effects on the environment.

Director
- Davis Guggenheim

Writer
- Al Gore

Stars
- Al Gore
- Billy West
- George Bush

Synopsis

"An Inconvenient Truth" (2006) is a documentary film that follows former United States Vice President Al Gore as he presents a comprehensive and urgent message about the reality of climate change. The film combines Gore's personal anecdotes with a detailed and visually compelling slide show that explains the scientific evidence behind global warming.

Gore illustrates the increase in carbon dioxide levels and its correlation with the rise in global temperatures, emphasizing the role of human activities, such as the burning of fossil fuels and deforestation, in contributing to this environmental crisis. The documentary explores the potential consequences of climate change, including rising sea levels, extreme weather events, and the impact on ecosystems.

Throughout the film, Gore highlights the political and economic challenges of addressing climate change, including the influence of powerful industries and the need for international cooperation. He also advocates for renewable energy solutions as a way to reduce carbon emissions.

The documentary concludes with a passionate call to action, urging viewers to take individual and collective steps to address climate change and reduce their carbon footprint. "An Inconvenient Truth" received critical acclaim for its compelling presentation of scientific facts and played a significant role in raising global awareness about the urgent need to address climate change.

SOURCE: HTTPS://WWW.IMDB.COM/TITLE/TT0910970/

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"Parched Reverie"

Beneath the sun's relentless gaze, a tale untold,
A land in whispers of despair, its secrets unfold.
Drought's cruel fingers clasp the earth's weary throat,
As rivers weep in silence, a parched antidote.

The fields, once green, now wear a coat of dust,
Crops bowed in surrender, their vigor lost in trust.
Clouds play hide-and-seek with a desperate sky,
Promises of rain dissolve, a heart-wrenching lie.

Cracked earth sighs, a sonnet of endless thirst,
Nature's orchestra muted, as dreams are dispersed.
Hollow winds carry echoes of a distant stream,
A mirage dances, a cruel, elusive dream.

Cattle's lowing, a melancholy serenade,
In arid landscapes, hope begins to fade.
Dust devils twirl in a melancholic trance,
A desolate ballet, a drought's cruel dance.

Villages yearn for the healing touch of rain,
A symphony of prayers, an earnest refrain.
Children with sunken eyes, dreams too frail,
In the drought's embrace, innocence turns pale.

Hope flickers like a lone candle in the dark,
Yet resilient hearts kindle an eternal spark.
Survival blooms in the midst of despair,
A community's strength, a silent prayer.

As the sun retreats, a respite sought,
Stars gaze upon a world so dearly bought.
Drought's tale etched in the lines of the land,
A plea for mercy, a fate to withstand.

Nature's canvas painted in hues of brown,
Yet within each droplet, hope cascades down.
For in the arid silence, a resilience grows,
A promise of rebirth, as the wind gently blows.

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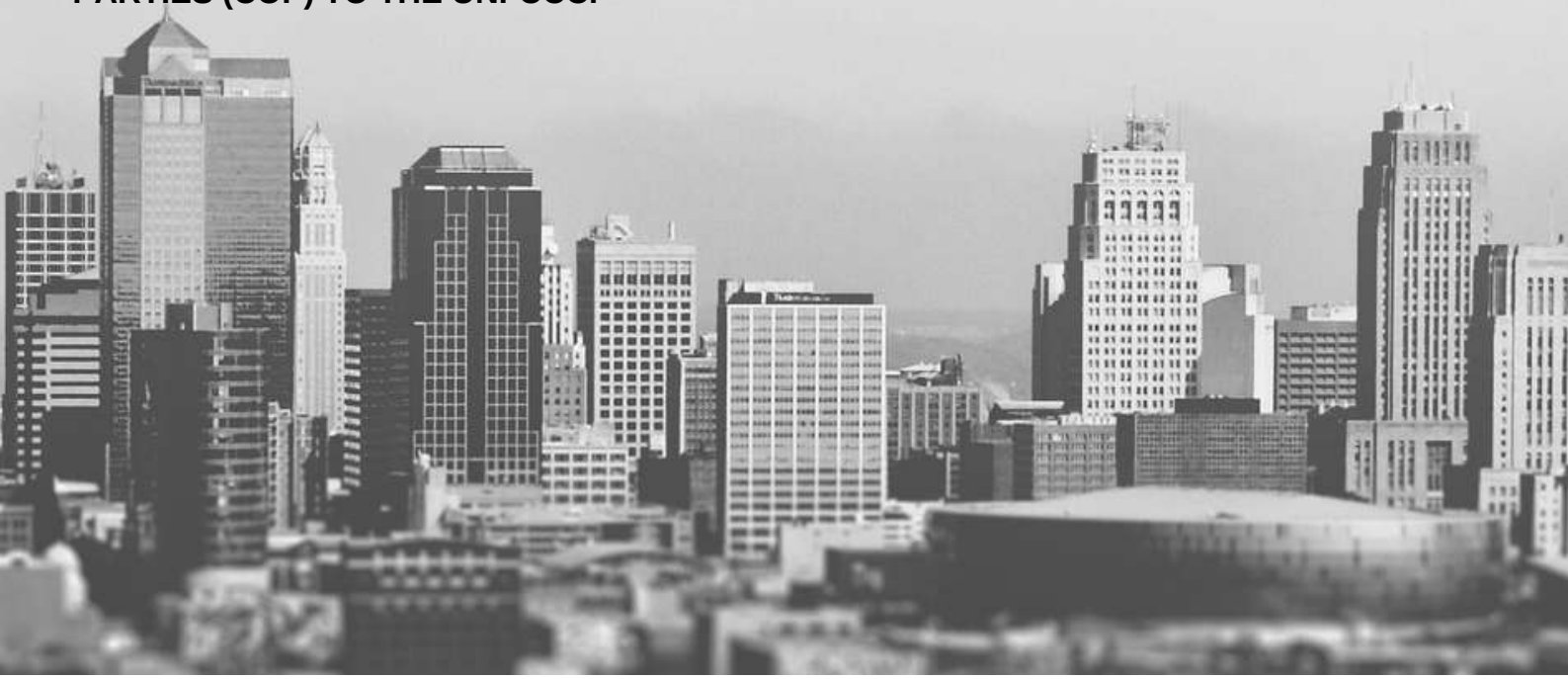
COP 28

COP 28 REFERS TO THE UNITED NATIONS CLIMATE CHANGE CONFERENCE TAKING PLACE IN DUBAI, UNITED ARAB EMIRATES, FROM 30 NOVEMBER UNTIL 12 DECEMBER 2023.

UN CLIMATE CHANGE CONFERENCES (OR COPS) TAKE PLACE EVERY YEAR, AND ARE THE WORLD'S ONLY MULTILATERAL DECISION-MAKING FORUM ON CLIMATE CHANGE WITH ALMOST COMPLETE MEMBERSHIP OF EVERY COUNTRY IN THE WORLD.

TO PUT IT SIMPLY, THE COP IS WHERE THE WORLD COMES TOGETHER TO AGREE ON WAYS TO ADDRESS THE CLIMATE CRISIS, SUCH AS LIMITING GLOBAL TEMPERATURE RISE TO 1.5 DEGREES CELSIUS, HELPING VULNERABLE COMMUNITIES ADAPT TO THE EFFECTS OF CLIMATE CHANGE, AND ACHIEVING NET-ZERO EMISSIONS BY 2050.

MORE THAN 70,000 DELEGATES ARE EXPECTED TO ATTEND COP28, INCLUDING THE MEMBER STATES (OR PARTIES) OF THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC). BUSINESS LEADERS, YOUNG PEOPLE, CLIMATE SCIENTISTS, INDIGENOUS PEOPLES, JOURNALISTS, AND VARIOUS OTHER EXPERTS AND STAKEHOLDERS ARE ALSO AMONG THE PARTICIPANTS.
OFFICIALLY, COP 28 STANDS FOR THE 28TH MEETING OF THE CONFERENCE OF THE PARTIES (COP) TO THE UNFCCC.



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