GRAPHICAL ANALYZE OF EPI 2022 SCORE BASED ON POPULATION, LAND AND AIR QUALITY

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Abstract: The environment refers to the totality of air, water, land and the interrelationships with humans, living organisms and materials. Reliance, change, adapt are the three types of interactions between environment and humans. Man-made activities are the main causes environmental issues like pollution, the introduction of something toxic and damaging, which degrade the ecosystem. By considering air, water, soil, noise and radioactive pollutions, air pollution is considered to be the most negatively impacting source of pollution across the world which taking away precious lives. The 2022 Environmental Performance Index (EPI) provides a data-driven summary of the state of sustainability around the world with 40 performance indicators across 11 issue categories. This paper reveals the comparative study on population, land and air pollution of some of the developed and developing countries in the world with India with graphical presentation.

I. INTRODUCTION

The 2022 Environmental Performance Index (EPI) provides a data-driven summary of the state of sustainability around the world. Using 40 performance indicators across 11 issue categories, the EPI ranks 180 countries on climate change performance, environmental health, and ecosystem vitality. These indicators provide a gauge at a national scale of how close countries are to established environmental policy targets. The EPI offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future.

EPI indicators provide a way to spot problems, set targets, track trends, understand outcomes, and identify best policy practices. Good data and fact-based analysis can also help government officials refine their policy agendas, facilitate communications with key stakeholders, and maximize the return on environmental investments. The EPI offers a powerful policy tool in support of efforts to meet the targets of the UN Sustainable Development Goals and to move society toward a sustainable future.

The answer to the question for needs of EPI can be explained as the overall Environmental Performance Index rankings indicate which countries are best addressing the environmental challenges that every nation faces. It provides a way to spot problems, set targets, track trends, understands outcomes, and identify best policy practices. Environmental indicators are essential tools for tracking environmental progress, supporting policy evaluation and informing the public. Since the early 1990s, such indicators have gained in importance in many countries. Specifically; environmental performance indicators (EPIs) examine environmental issues such as pollution, biodiversity, climate, energy, erosion, ecosystem services, environmental education, and many others. Without these EPIs, the success or failure of even the most well-intentioned actions can remain hidden. The Environment Performance Index (EPI) is an international ranking system that measures the environmental health and sustainability of countries. The EPI, a biennial index, was started in **2002** as Environmental Sustainability Index by the World Economic Forum.

The importance of Performance index can be defined as the EPI offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future. EPI indicators provide a way to spot problems, set targets, track trends, understand outcomes, and identify best policy practices. The 2022 Environmental Performance Index (EPI) provides a data-driven summary of the state of sustainability around the world. Using 40 performance indicators across 11 issue categories, the EPI ranks 180 countries on climate change performance, environmental health, and ecosystem vitality.

Environmental metrics typically include reduction of electricity usage, change in fuel consumption for company vehicles, carbon emissions reductions, gallons of water saved, and increased waste diversion. Recently, the World Economic Forum released the Environmental Performance Index (EPI) 2022, on June 6, 2022, ranking 180 countries in terms of climate change performance, environmental health and ecosystem vitality. Denmark had the highest level of environmental performance worldwide with an EPI value of 77.90.

Five important global-scale environmental indicators are biological diversity, food production, average global surface temperature and atmospheric CO_2 concentrations, human population, and resource depletion. These key environmental indicators help us analyze the health of the planet. One subset of environmental indicators is the collection of ecological indicators which can include physical, biological and chemical measures such as atmospheric temperature, the concentration of ozone in the stratosphere or the number of breeding bird pairs in an area.

The benefits of measuring a company's environmental performance are understood the company's impacts and dependencies on ecological functions. Understand how the local populations impact and depend on ecological functions. Make informed decisions based on sound science. Collaborate with regulators and communities in a transparent process.

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II. INDIAN SCORE IN EPI 2022

The ranking on the Environmental Performance Index (EPI) of 2022, India scored the lowest among 180 countries, published by researchers from Yale and Columbia Universities. The report assesses countries on 40 performance indicators which are further grouped into 11 issues categories. Among the eleven issue categories , India's performance was poorest in Air quality with a ranking of 179 out of 180 nations (179/180), quality of Bio-diversity and habitat (179/180) which assesses a country's actions in retaining natural ecosystems and protecting biodiversity within its borders, Climate change mitigation (165/180),Ecosystem services (97/180), Fisheries (42/136), Acid rain(132/180), Water resources (112/141),Sanitation and drinking water(139/179),Heavy metals (174/180) and waste management (151/180).The core of the report depend on 3 policy objectives such as environmental health , climate change and ecosystem vitality. The weight age given to environmental health, climate change and ecosystem vitality are 20%, 38% and 42% respectively. The index scores countries between 0 and 100, from worst to best performance and India scored (18.90/100), while Denmark ranked first with score (77.90/100) [1].

III. COMPARISON BASED ON POPULATION ,LAND & AIR QUALITY

Any country needs to know the size and composition of its population. Population growth will lead to economic growth with more people able to produce more goods. The land sustains every aspect of our lives, providing fundamental life-support systems and the foundation of our economy and society. It is the place we stand. And also, the place we act. It is where we make decisions that affect not just the land, but also water, oceans, air, and atmosphere, and the life they support. Air pollution is one of the greatest environmental risk to health. Exposure to air pollution can affect everyone's health.

| Country	Population [Millions]	EPI 2022 (Rank / 180)	EPI 2022 (Score / 100)	EPI 2022 (Score / 1000)	Land Area [sq.km]
China	1402.11	160	28.40	284	9400019.38
India	1380	180	18.90	189	3166954.94
United States of America	333.07	43	51.10	511	9498570.76
Indonesia	273.52	164	28.20	282	1917290.15
Pakistan	220.89	176	24.60	246	877132.47
Brazil	21.56	81	43.60	436	8552004.8
Nigeria	206.14	162	28.30	283	913779.28
Bangladesh	164.69	177	23.10	231	140303.37
Russia	144.1	112	37.50	375	16883163.07
Mexico	128.93	73	45.50	455	1960837.92

Table 1 – Countries with population and land area.
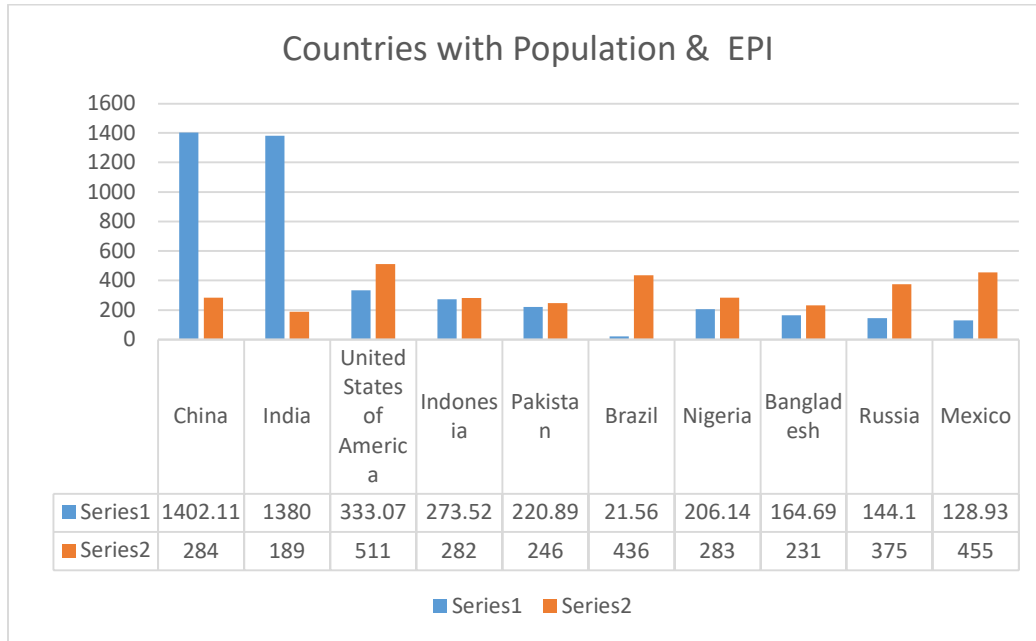
Figure-1 Comparison of population with EPI

With the rapid development of industrialization and urbanization, atmospheric pollution research is vital for regional sustainable development and related policies formulated by the government.[2]
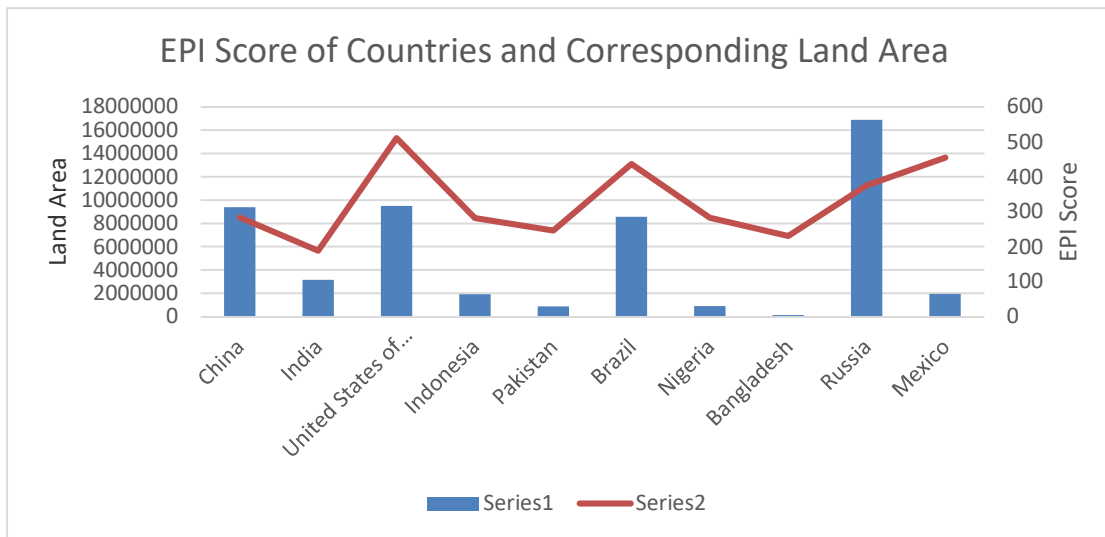

Figure-1 Comparison of Land with EPI

Country	Population [Millions]	EPI 2022 (Score / 100)	EPI 2022 (Score / 1000)	Air Quality (Score / 100)	Air Quality (Score / 1000)	Air Quality Rank / 180)
China	1402.11	28.40	284	20.60	206	157
India	1380	18.90	189	7.80	78	179
United States of America	333.07	51.10	511	77.00	770	16

Indonesia	273.52	28.20	282	21.50	215	152
Pakistan	220.89	24.60	246	5.70	57	180
Brazil	21.56	43.60	436	44.90	449	57
Nigeria	206.14	28.30	283	13.80	138	174
Bangladesh	164.69	23.10	231	14.40	144	166
Russia	144.1	37.50	375	48.80	488	49
Mexico	128.93	45.50	455	34.20	342	94

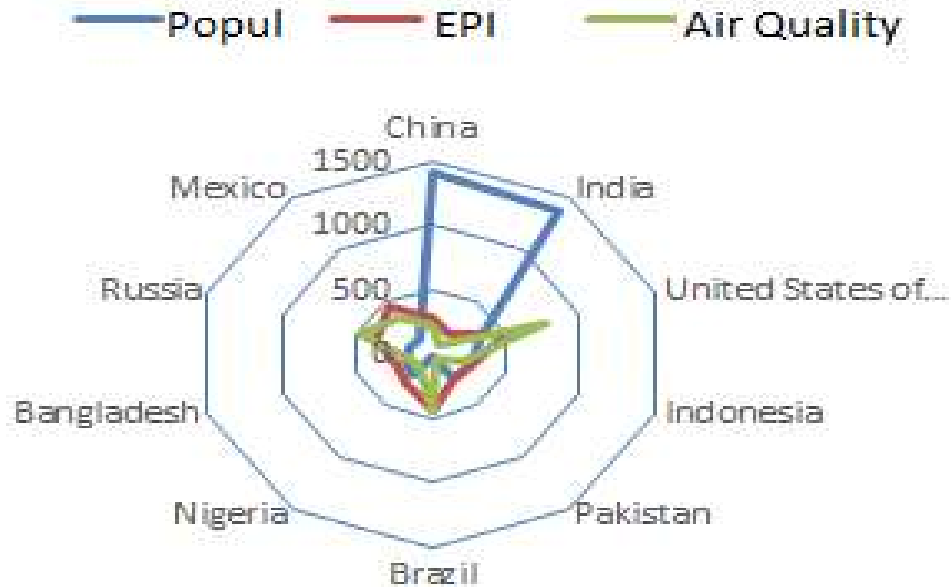Table 2 – Countries EPI with Population & Air quality

Figure 2 – Countries EPI with population and Air quality

IV. DEVELOPED COUNTRIES WITH EPI

Countries may be classified as either developed or developing based on the gross domestic product (GDP) or gross national income (GNI) per capita, the level of industrialization, the general standard of living, and the amount of technological infrastructure, among several other potential factors. Most developed countries in the world 2022 are as follows[3]

Country	Population (Millions)	Rank in EPI	Score in EPI
Norway	5.38	20	59.30
Australia	25.69	17	60.10
Ireland	4.99	24	57.40
Iceland	0.37	10	62.80
Switzerland	8.64	9	65.90
Netherland	17.44	11	62.60
United Sates of America	333.07	43	51.10
Germany	83.24	13	62.40
New zealand	5.08	26	56.70
Canada	38.01	49	50.00
Singapore	5.69	44	50.90

Denmark	5.83	1	77.90
Japan	125.84	25	57.20
United Kingdom	67.25	2	77.70
France	67.43	12	62.50

Table 3 – Developed countries with population and EPI ranking
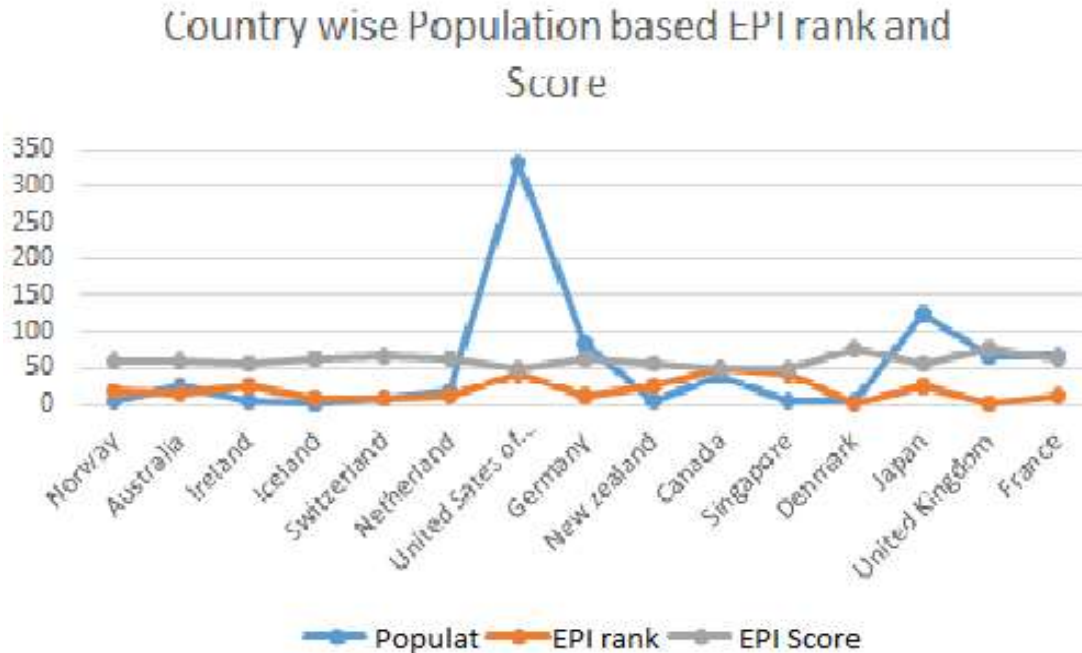

Figure 3 – Developed Countries with population, EPI score and EPI rank

The environmental performance of developing countries by conducting a comparative study across the countries to determine 1) whether variations exist in environmental performance using alternative measures of performance, 2) the extent of variation if they exist, and 3) the variables that can help explain the existing variation[4]

Developing countries in various regions of the world are as follows

Regions	Africa	East Asia and Pacific	Europe and Central Asia	Latin America and Caribbean	Middle East and North Africa	South Asia	Total
No. of Countries	45	21	22	29	13	8	138

Table 4 – Developing Countries in region wise

Some of the developing countries with rank in the list EPI as follows

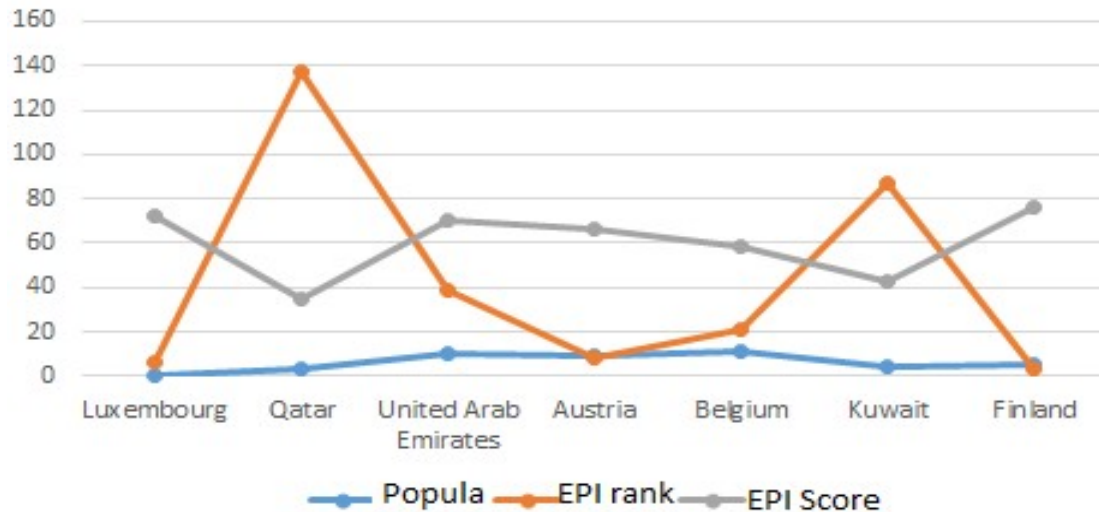| Country	Population (Millions)	Rank in EPI	Score in
Luxembourg	0.63	6	72.30
Qatar	2.88	137	34.50
United Arab Emirates	9.89	39	70.40
Austria	8.92	8	66.50
Belgium	11.56	21	58.20
Kuwait	4.27	87	42.40
Finland	5.53	3	76.50

Figure 4 – Developing Countries with population, EPI score and EPI rank

It is very difficult to find the correct way to measure the difference between developed and developing countries. One of the factors considered for deciding the same is Gross Domestic Product (GDP, per capita GDP, the general quality of life, level of technology available that is infrastructure, industrialization and education. However, to consider a country developed, the main factor considered is socio-economic development. When a country achieves a specific socio-economic requirement, it is deemed developed. The World Bank has divided countries into four major groups, low-income, low, middle-income, upper-middle-income, and high-income, based on their gross national income per capita. According to United Nations, in 2020, 35 countries have been marked as developed nations, North America, Europe, or developed Asian Pacific is home to all these developed countries. Here is the list of the top 10 developed countries according to Gross Domestic Product sorted alphabetically.

- **Australia:** One of the richest countries in the Asia Pacific region and has a better of life than any other nations. Due to high level of industrialization and very high quality of healthcare, Australian Republic has been considered as developed nation. The country is placed in 17th position in the EPI 2022 ranking.
- **Belgium:** The first European nation has provided a fine quality of life to people of the country. Even though Belgium does not have many natural resources, country depends on importing the raw materials and has positioned itself as a significant exporter of various manufactured goods due to its central geographic location, proper use of a diverse transportation network, and better commercial and industrial base. Due to these circumstances, country positioned in 21st rank in the EPI 2022.
- **Canada:** Due to the abundance of natural resources like oil, coal and gas, and the use of renewable energy sources, Canada has been marked as the tenth largest economy in the world. Country provides a well-reformed healthcare system and 59.3% of the country's power comes from water, 18.9% of the energy supply comes from renewable energy sources. So, the country placed in 49th position in EPI 2022 ranking.
- **France:** As per 2019 data France has the seventh largest economy by GDP in the world due to broad tourism, high level industrialization and medicines. Even though France motivated privatization in well-known enterprises, country retains a large portion of the military sector, transportation and electricity. According to 2020 data, due to high industrialization, there is very little unemployment with a rate of only 8.34%. Country is positioned in 12th rank in EPI 2022.
- **Germany:** The Germany stands at the 4th position in the world in terms of GDP. Germany has highly trained workforce for producing good quality product in the field of automobile, electronics, medicines and machinery. So, Germany is world's second-largest surplus economy just after China in terms of import and export. Germany is placed in 13th position in EPI 2022.
- **Italy:** Italy is ranked at sixth position in terms of GDP and well known for manufacturing high quality luxury goods. More than 25 million people, nearly 71% are employed in the service sector. Italy accounts for 2.28 % of the total wealth of the world.

- **Japan:** Japan is the world's 3rd richest country in terms of its total GDP. According to data on 2019, seventy-two percentage of people work in the service sector. Country is highly depending on the import of natural resources because country does not have natural resources. The main reason behind the success of Japan is its sophisticated technology. The country is place in 25th position in the ranking of EPI 2022.
- **Switzerland**: Switzerland stands at the 4th position in the GDP per capita. The reason behind is universal health care system to its people, trained work force, better technology and highly quality in manufacturing products. Switzerland is placed in the 9th position in EPI 2022 ranking.
- **United Kingdom:** United Kingdom, the first industrialized country, stands at 6th position in terms of the GDP. Country maintains its GDP by relying heavily on its service sector, banking, insurance and notable business service. United Kingdom is ranked in the second position in the EPI 2022.
- **United States of America**: The United States of America stands, the richest nation on the planet accounting for 16% wealth of the whole world, at first position in the GDP. The US is the greatest importer and the second-largest exporter of manufacturing products. The flexible company investment and foreign direct investment are main reason of country's growth. The service sector, real estate, insurance and banking are the main contributing sectors to the GDP. EPI 2022 ranking of the US is 43rd position.

V. AIR POLLUTION BASED ON AQI

The goal of the AQI (Air Quality Index) is a daily air quality reporting index , which is to educate people about what impact their local air quality have on their health. The PM 2.5 levels of less than 12 are regarded healthy, the range between 55 and 150 are deemed unhealthy, and more than 250 are considered critical [5]. AQI is a metric that measures how air pollution affects a person's health over a brief span of time.

Level of concern	Good	Moderate	Unhealthy for sensitive Group	Unhealthy	Very Unhealthy	Hazardous
Value of Index(AQI)	0 - 50	51- 100	101 - 150	151 - 200	201-300	>300

Table 6 – AQI Level

The US AQI is EPA's index for reporting air quality, it tell us how polluted or clean our air and what associated health effects might be concern for us. A Switzerland based air quality technology (IQAir) is used for air quality monitoring, which list out the following cites. Cities with high PM concentration and exposed population are more susceptible to mortality and hospital admissions [6]. Highly industrialized cities located in cold climate zones observed a higher reduction in air pollution[7]. List of 10 most polluted cities in 2021 as follows

Sl. No,	City	US AQI	Country
1	Delhi	198	India
2	Lahore	194	Pakistan
3	Kuwait city	132	Kuwait
4	Maxico city	128	Maxico
5	Dhaka	122	Bangladesh
6	Kolkata	121	India
7	Karachi	117	Pakistan
8	Mumbai	117	India
9	Dubai	117	United Arab Emirates
10	Sarajevo	105	Bosnia Herzegovina

Table 7 – Most Polluted cites as per 2021

VI. CONCLUSION

Man made activities are the main causes environmental issues like pollution, the introduction of something toxic and damaging, which degrade the ecosystem. The 2022 Environmental Performance Index (EPI) provides a data-driven summary of the state of sustainability around the world. Even though India rejects Environment Performance Index 2022 that ranked it lowest among 180 countries, it is an opportunity to improve the 40 performance indicators across 11 categories to judge countries on climate change

performance, environmental health and ecosystem vitality for the protection of our environment. These ideas are described with tables and diagrams. UN chief António Guterres said in his message that "nature is sending us a clear message. We are harming the natural world, to our own detriment." To care for humanity, we must care for nature."

References

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