KEY ENVIRONMENTAL PROBLEMS

1. Pollution:-

Pollution is the introduction to the harmful materials into the environment. These harmful materials are called pollutants. Pollutants can be natural, such as volcanic ash. They can also be created by human activity, such as trash or runoff produced by factories. Pollutants damage the quality of air, water and land.

Types of pollution:-

A)Air pollution=the release of chemicals and particulates into the atmosphere. Common gaseous pollutants include carbon monoxide, sulphur dioxide, chlorofluorocarbon and nitrogen oxides produced by industry and motor vehicle Photochemical Ozone and smog are created as nitrogen oxides and hydrocarbons react to sunlight. Particulate matter, or fine dust is characterised by their micrometre size PM10 to PM2.5.

Causes:-

A) Burning of fossil fuels.

B) Toxic gaseous from industries.

c) Wildfire

d) Open garbage burning.

e) Indoor air pollution from household appliances.

Effects:-

1) Respiratory and heart problems.

2) Child health problems.

3) Global warming.

4) Acid rain.

5) Eutrophication.

6) Effect on wildlife.

7) Depletion of the ozone layer.

b) Water Pollution:-It is caused by discharge industrial wastewater from commercial and industrial waste into surface waters, discharge of untreated sewage and chemical contaminants into surface runoff flowing through surface waters.

Causes:-

a) Sewage waste water from houses.

b) Acid rain.

c) Dumping

d) Oil pollution

e) Industrial waste

f) Use of fertilizers and pesticides

g) Mining activities

Effects:-

1. Contamination of the food chain
2. Lack of potable water
3. Disease due to contaminated water
4. Infant mortality rate decreases
5. Destruction of biodiversity

3) Land Pollution:-It refers to the deterioration of the earth's land surface, at and below ground level. This causes is the accumulation of the solid and liquid waste materials that contaminate groundwater and soil.

Causes:-

a) Contamination of soil
b) Mining
c) Nuclear waste
d) Construction
e) Landfills
f) Hydraullic Fracturing

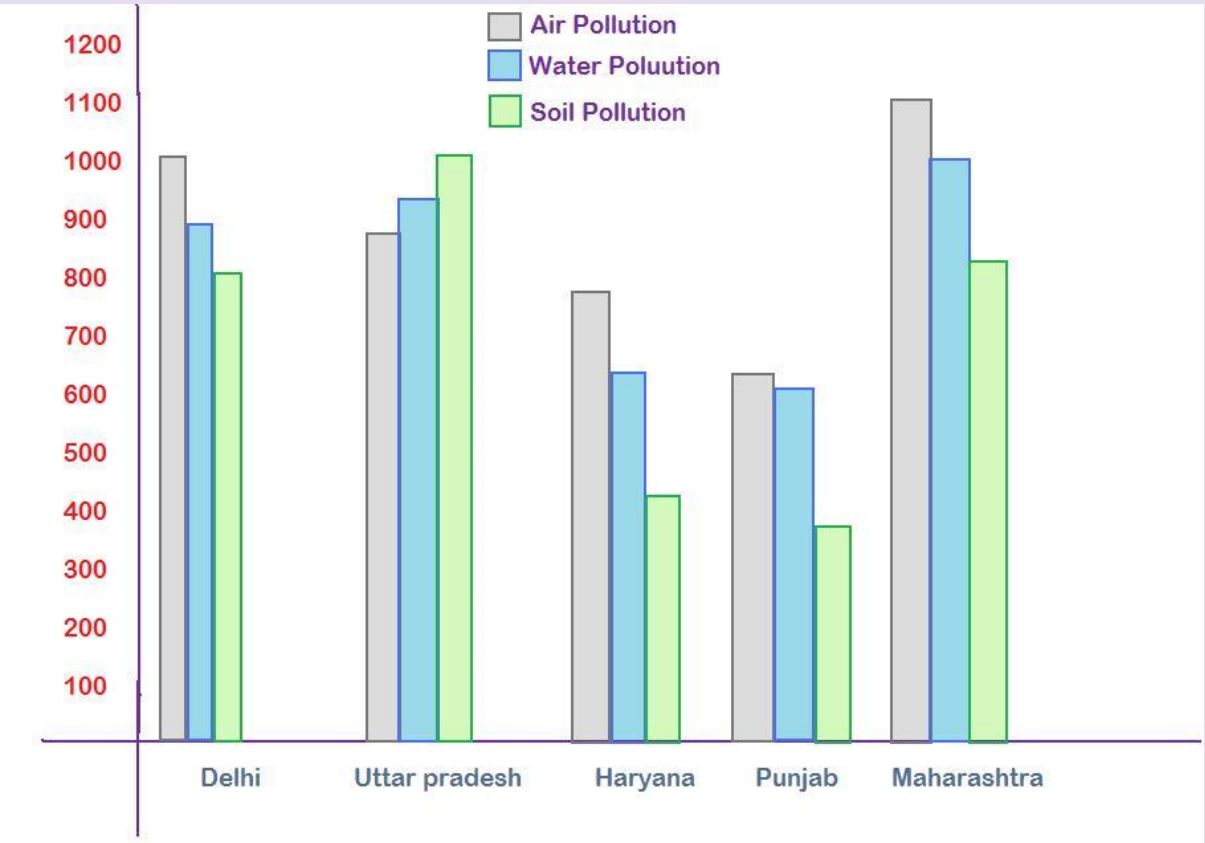
Effects=

1. Water isn't safe for drinking
2. Polluted soil ,which leads to a loss of fertile land for agriculture
3. Climate change, which causes on onslaught of disastrous problems, including flash floods and irregular rainfalls
4. The endangerment and the extinction of species in the wildlife
5. Habitat shifting where some animals are forced to flee Where they live in order to survive
6. An increase in wildfires, due to polluted areas often becoming very dry

Some other pollution which causes major environmental problems are:-

1. Electromagnetic pollution: the overabundance of electromagnetic radiation in their non-ionizing form, such as radio and television transmission etc.
2. Light pollution: includes light trespass, over-illumination and astronomical interference.
3. Littering: the criminal throwing of inappropriate man-made objects, unremoved, onto public and private properties.
4. Noise pollution: which encompasses road way noise, aircraft noise, industrial noise as well as high intensity sonar.

5. Thermal pollution: is a temperature change in natural water bodies caused by human influences, such as use of water coolant in power plants. This leads to increase in temperature of water and damages the aquatic life.



2. Climate Change:-

Climate change refers to the long-term shifts in temperature and whether patterns. These shifts may be natural, such as through variations in the solar cycle. But since 1800s, human activities have been the main driver of the climate change, primarily due to the burning of fossil fuels like coal, oil and gas.

Causes due to humans:

Humans cause climate change by releasing carbon dioxide and other greenhouse gases into the air. Today, there is more carbon dioxide in the atmosphere than there ever has been in at least the past 2 million years. During the 20th and 21st century, the level of carbon dioxide rose by 40%.

We produce greenhouse gases in lots of different ways:

- Burning fossil fuels – Fossil fuels such as oil, gas, and coal contain carbon dioxide that has been 'locked away' in the ground for thousands of years. When we take these out of the land and burn them, we release the stored carbon dioxide into the air.
- Deforestation – Forests remove and store carbon dioxide from the atmosphere. Cutting them down means that carbon dioxide builds up quicker since there are no trees to absorb it. Not only that, trees release the carbon they stored when we burn them.
- Agriculture – Planting crops and rearing animals releases many different types of greenhouse gases into the air. For example, animals produce methane, which is 30 times more powerful than carbon dioxide as a greenhouse gas. The nitrous oxide used for fertilizers is ten times worse and is nearly 300 times more potent than carbon dioxide!
- Cement – Producing cement is another contributor to climate change, causing 2% of our entire carbon dioxide emissions.

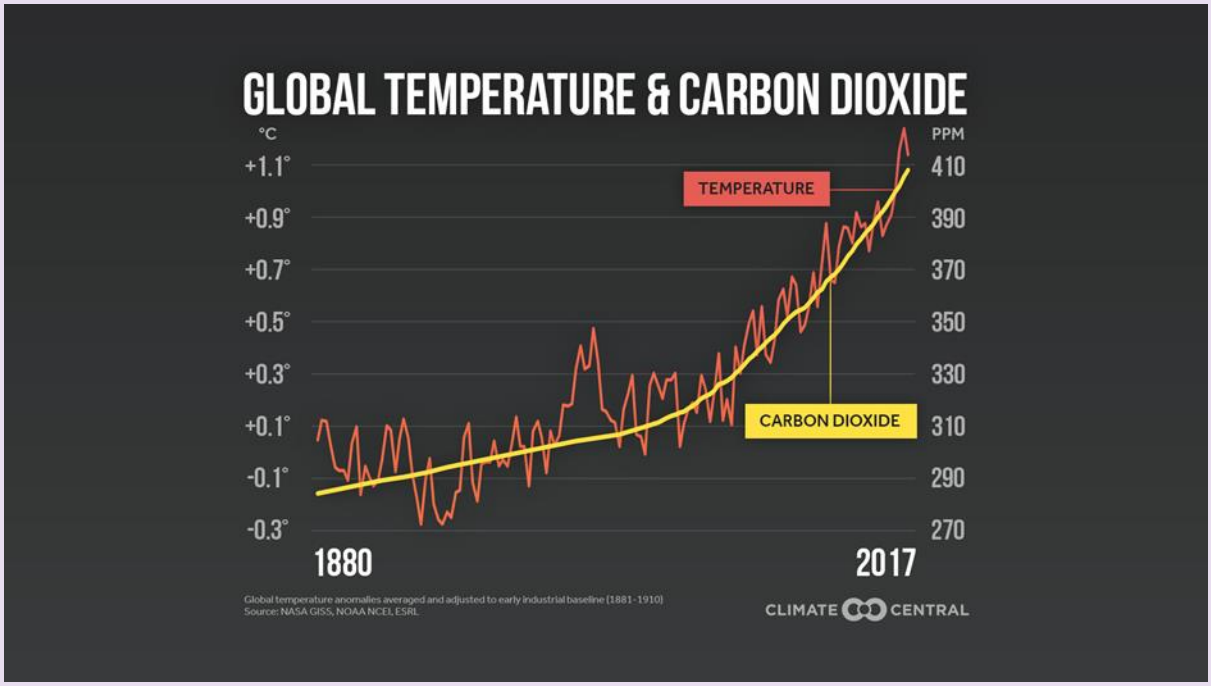
Natural causes of climate change: Some of the natural causes are volcanic eruptions, ocean currents, the earth’s orbital changes, solar variations and internal variability.

Effects of Climate change:-

1. **Hotter temperatures:** Nearly all land areas are seeing more hot days and heat waves; 2020 was one of the hottest years on record. Higher temperatures increase heat-related illnesses and can make it more difficult to work and move around. Wildfires start more easily and spread more rapidly when conditions are hotter.
2. **More serves storms:** Changes in temperature cause changes in rainfall. This results in more severe and frequent storms. They cause flooding and landslides, destroying homes and communities, and costing billions of dollars.
3. **Increased drought:** Water is becoming scarcer in more regions. Droughts can stir destructive sand and dust

storms that can move billions of tons of sand across continents. Deserts are expanding, reducing land for growing food. Many people now face the threat of not having enough water on a regular basis.

4. **Not enough food:** Changes in temperature cause changes in rainfall. This results in more severe and frequent storms. They cause flooding and landslides, destroying homes and communities, and costing billions of dollars.
5. Poverty and displacement: Climate change increases the factors that put and keep people in poverty. Floods may sweep away urban slums, destroying homes and livelihoods. Heat can make it difficult to work in outdoor jobs. Weather-related disasters displace 2.3 crore people a year, leaving many more vulnerable to poverty.



3. Overpopulation:

Overpopulation refers to the exceeding of certain threshold limits of population density when environmental resources fail to meet the requirements of individual organisms regarding shelter, nutrition and so forth

In India according to the survey carried population growth rate is 12.6 per cent between 2011 and 2021. In the same period, UP's population has grown at 15.6 per cent and Bihar at 18.2 per cent

Causes of overpopulation:-

1. Falling Mortality Rate: - The primary (and perhaps most obvious) cause of population growth is an imbalance between births and deaths. The infant mortality rate has decreased globally, with 4.1 million infant deaths in 2017 compared to 8.8 million in 1990, according to the World Health Organization (WHO). This is welcome public health news, of course.

At the same time, lifespans are increasing around the world. Those of us who are alive today will likely live much longer than most of our ancestors. Global average life expectancy has more than doubled since 1900, thanks to advancements in medicine, technology, and general hygiene. Falling mortality rates are certainly nothing to complain about either, but widespread longevity does contribute to the mathematics of increasing population numbers.

2. Underutilized Contraception: - The global fertility rate has fallen steadily over the years, down from an average of 5 children per woman in 1950 to 2.4 children per woman today, according to the UN Population Division. Along with that promising trend, contraceptive use has slowly but steadily increased globally, rising from 54% in 1990 to 57.4% in 2015. Yet, on the whole, contraceptive use is still underutilized. For example, according to the WHO, an estimated 214 million women in developing countries who want to avoid pregnancy are not using modern contraceptives.

These women aren't using contraceptives for a variety of reasons, including social norms or religious beliefs that discourage birth control, misconceptions about adverse side effects, and a lack of agency for women to make decisions around sex and family planning. An estimated 44% of pregnancies were unintended worldwide between 2010-2014. Getting more women the access and agency to utilize family planning methods could go a long way in flattening the population curve.

3. Lack of female education: - Although female access to education has increased over the years, the gender gap remains. Roughly 130 million girls worldwide are out of school currently, and an estimated 15 million girls of primary school age will *never* learn to read and write, compared with 10 million boys.

Increasing and encouraging education among women and girls can have a number of positive ripple effects,

including delayed childbearing, healthier children, and an increase in workforce participation. Plenty of evidence suggests a negative correlation between female education and fertility rates.

If increased female education can delay or decrease fertility and provide girls with opportunities beyond an early marriage, it could also help to mitigate current population trends.

Effects of overpopulation:-

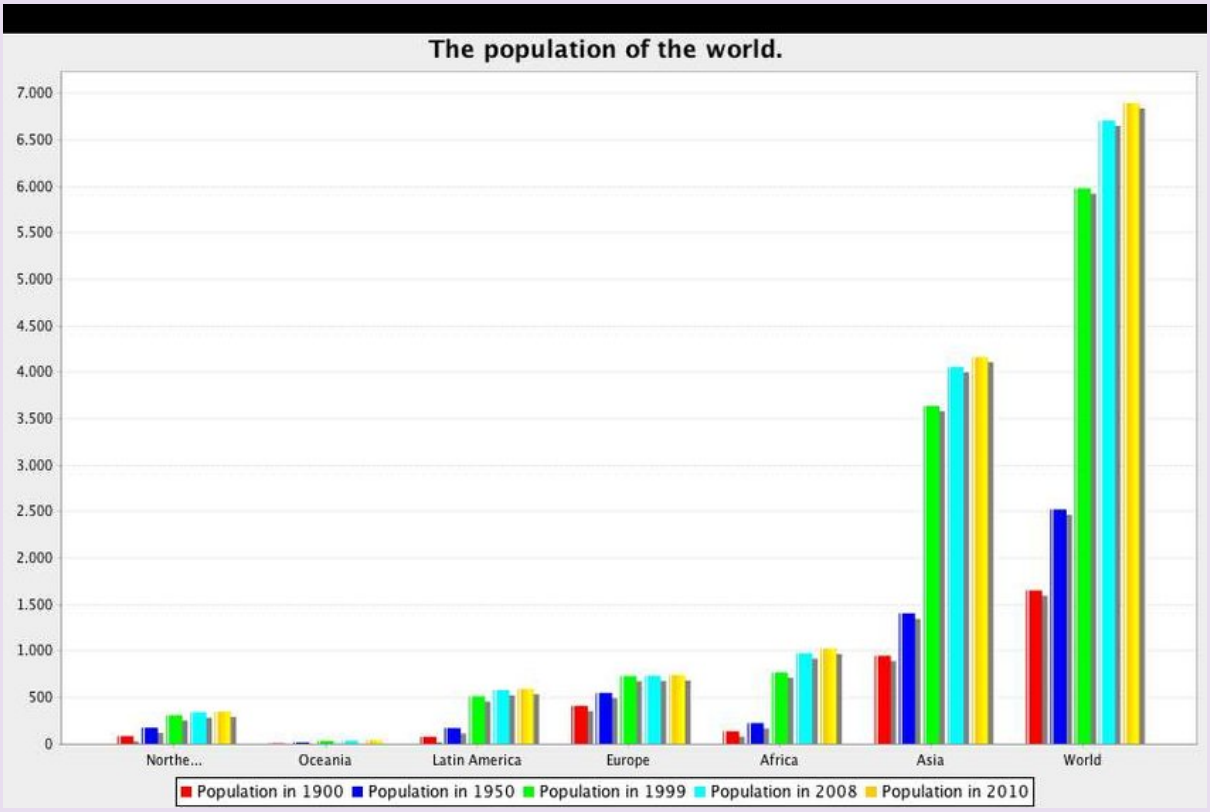
1. Ecological Degradation: - An increase in population will inevitably create pressures leading to more deforestation, decreased biodiversity, and spikes in pollution and emissions, which will exacerbate climate change. Ultimately,

unless we take action to help minimize further population growth heading into the remainder of this century, many scientists believe the additional stress on the planet will lead to ecological disruption and collapse so severe it threatens the viability of life on Earth as we know it.

Each spike in the global population has a measurable impact on the planet's health. According to estimates in a study by Wanes and Nicholas (2017), a family having one fewer child could reduce emissions by 58.6 tones CO_2-equivalent per year in developed countries.

2. Increased Conflicts: - The scarcity brought about by environmental disruption and overpopulation has the potential to trigger an increase in violence and political unrest. We're already seeing wars fought over water, land, and energy resources in the Middle East and other regions, and the turmoil is likely to increase as the global population grows even larger.

3. Higher risk of disaster and pandemics: - Many of the recent novel pathogens that have devastated humans around the world, including COVID-19, Zika virus, Ebola, and West Nile virus, originated in animals or insects before passing to humans. Part of the reason the world is entering "a period of increased outbreak activity" is because humans are destroying wildlife habitats and coming into contact with wild animals on a more regular basis. Now that we're in the midst of a pandemic, it has become clear how difficult it is to social distance in a world occupied by nearly 8 billion people


The population of the world.
7.000
6.500
6.000
5.500
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
500
0
Northe...
Oceania
Latin America
Europe
Africa
Asia
World
Population in 1900
Population in 1950
Population in 1999
Population in 2008
Population in 2010

4. Ozone Layer Depletion

Ozone layer depletion is the gradual thinning of the earth's ozone layer in the upper atmosphere caused due to the release of chemical compounds containing gaseous bromine or chlorine from industries or other human activities. One chlorine can destroy 100,000 molecules of ozone. It is destroyed more quickly than it is created.

Some compounds release chlorine and bromine on exposure to high ultraviolet light, which then contributes to ozone layer depletion. Such compounds are known as Ozone Depleting Substances (ODS).

The ozone-depleting substances that contain chlorine include chlorofluorocarbon, carbon tetrachloride, hydro chlorofluorocarbons, and methyl chloroform. Whereas, the ozone-depleting substances that contain bromine are halons, methyl bromide, and hydro bromofluorocarbons.

Chlorofluorocarbons are the most abundant ozone-depleting substance. It is only when the chlorine atom reacts with some other molecule, it does not react with ozone.

Montreal Protocol was proposed in 1987 to stop the use, production and import of ozone-depleting substances and minimize their concentration in the atmosphere to protect the ozone layer of the earth.

Causes of Ozone layer depletion:-

Ozone layer depletion is a major concern and is associated with a number of factors. The main causes responsible for the depletion of the ozone layer are listed below:

1. Chlorofluorocarbons:-Chlorofluorocarbons or CFCs are the main cause of ozone layer depletion. These are released by solvents, spray aerosols, refrigerators, air-conditioners, etc.

The molecules of chlorofluorocarbons in the stratosphere are broken down by ultraviolet radiations and release chlorine atoms. These atoms react with ozone and destroy it.

2. Unregulated Rocket Launches:-Researchers say that the unregulated launching of rockets results in much more depletion of the ozone layer than the CFCs do. If not controlled, this might result in a huge loss of the ozone layer by the year 2050.

3. Nitrogenous Compounds:-The nitrogenous compounds such as NO_2, NO, N_2O are highly responsible for the depletion of the ozone layer.

4. Natural Causes:-The ozone layer has been found to be depleted by certain natural processes such as Sun-spots and stratospheric winds. But it does not cause more than 1-2% of the ozone layer depletion.

The volcanic eruptions are also responsible for the depletion of the ozone layer.

Effects of ozone layer depletion

The depletion of the ozone layer has harmful effects on the environment. Let us see the major effects of ozone layer depletion on man and environment.

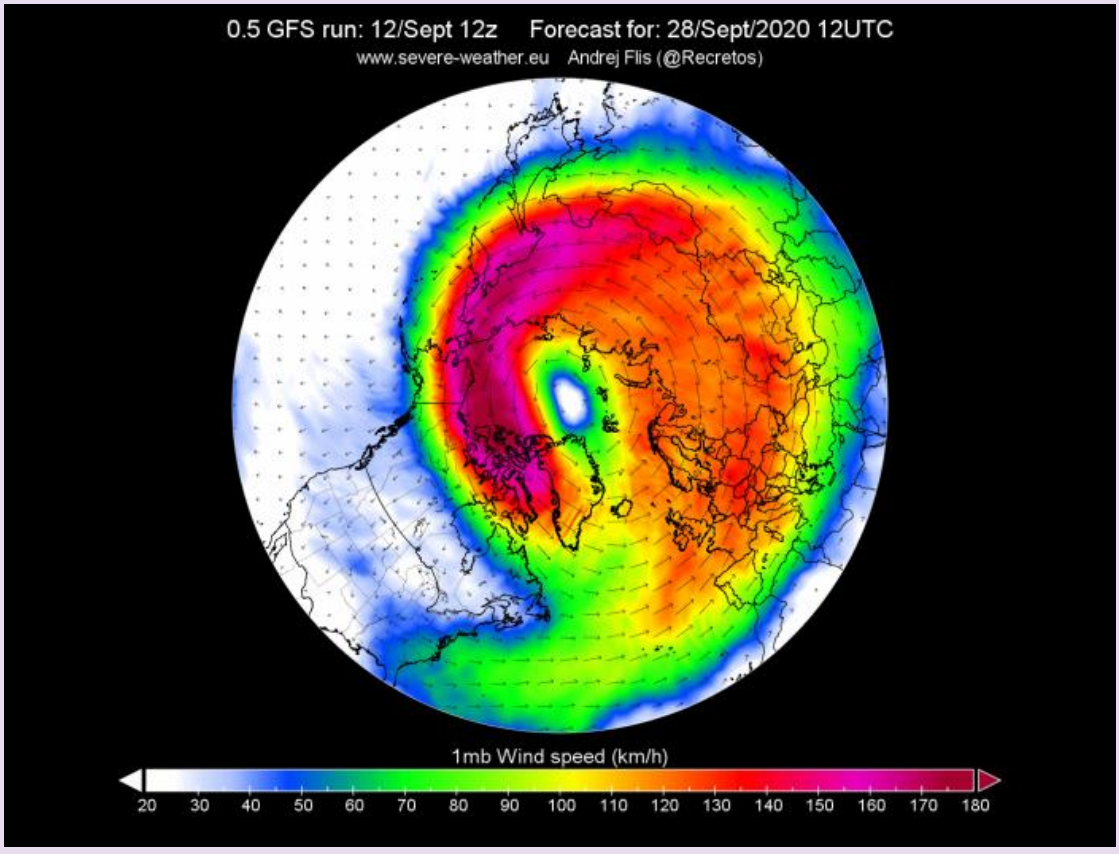
1. Effects on Human Health:-Humans will be directly exposed to the harmful ultraviolet radiation of the sun due to

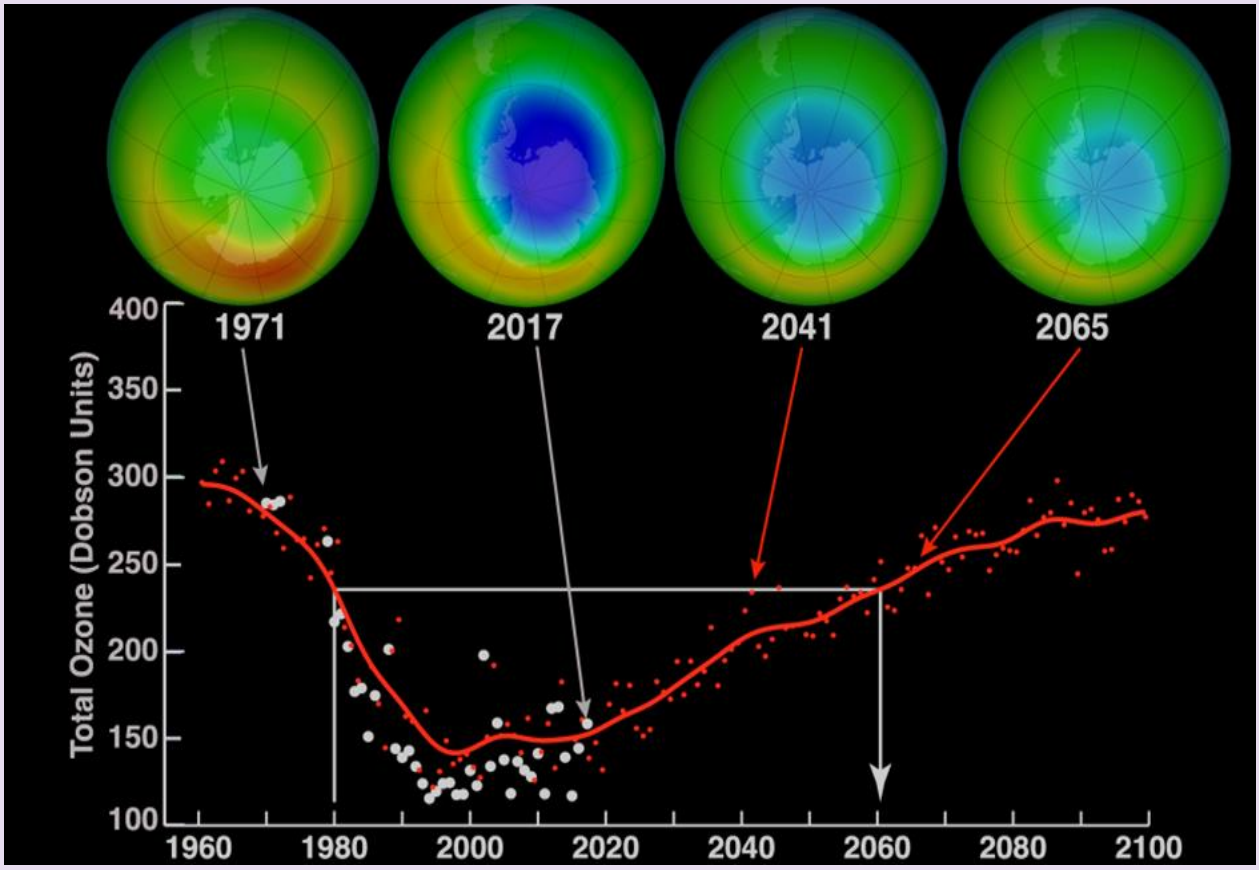
the depletion of the ozone layer. This might result in serious health issues among humans, such as skin diseases, cancer sunburns, cataract, quick ageing and weak immune system.

2. Effects on Animals:-Direct exposure to ultraviolet radiations leads to skin and eye cancer in animals.

3. Effects on the Environment:-Strong ultraviolet rays may lead to minimal growth, flowering and photosynthesis in plants. The forests also have to bear the harmful effects of the ultraviolet rays.

4. Effects on Marine Life:-Planktons are greatly affected by the exposure to harmful ultraviolet rays. These are higher in the aquatic food chain. If the planktons are destroyed, the organisms present in the food chain are also affected.




1971
2017
2041
2065
Total Ozone (Dobson Units)
400
350
300
250
200
150
100
1960
1980
2000
2020
2040
2060
2080
2100

5. Deforestation

Deforestation refers to the decrease in forest areas across the world that are lost for other uses such as agricultural croplands, urbanization, or mining activities. Greatly accelerated by human activities since 1960, deforestation has been negatively affecting natural ecosystems, biodiversity, and the climate. The UN's Food and Agriculture Organization estimates the annual rate of deforestation to be around 1.3 million km^2 per decade.

Causes

1. Agricultural Activities: - As earlier mentioned in the overview, agricultural activities are one of the significant factors affecting deforestation. According to the FAO, agriculture leads to around 80% of deforestation. Due to the overgrowing demand for food products, a huge amount of trees are felled to grow crops, and 33% of agriculture-caused deforestation is because of subsistence agriculture.

2. Livestock ranching: - Livestock is believed to be responsible for about 14% of global deforestation. Farmers often clear the land by cutting down trees and burning them to raise livestock and grow food. They continue to use the property until the soil is completely degraded and repeat the same process on new woodland. Eventually, it'll reforest, but it will take many years to return to its original condition. Surprisingly, over the past 40 years, the forest area has reduced by almost 40 percent, and during the same period,

pasture regions and cattle populations have grown significantly and rapidly.

3. Illegal logging: - Apart from this, wood-based industries like paper, match-sticks, furniture, etc. also need a substantial amount of wood supply. Wood is used as fuel, both directly and indirectly. Therefore trees are chopped for meeting the demand for supplies. Firewood and charcoal are examples of wood being used as fuel. Some of these industries thrive on illegal wood cutting and felling of trees.

4. Urbanization: - Further, to gain access to these forests, the construction of roads is undertaken; here again, trees are chopped to build roads. Overpopulation too directly affects forest covers, as with the expansion of cities, more land is needed to establish housing and settlements. Therefore forest land is reclaimed.

5. Desertification of land:-Some of the other factors that lead to deforestation are also partly natural and partly anthropogenic, like desertification of land. It occurs due to land abuse, making it unfit for the growth of trees. Many industries in petrochemicals release their waste into rivers, which results in soil erosion and make it unfit to grow plants and trees.

6. Mining:-Oil and coal mining requires a considerable amount of forest land. Apart from this, roads and highways have to be built to make way for trucks and other equipment. The waste that comes out from mining pollutes environment and affects the nearby species.

7. Forest Fires

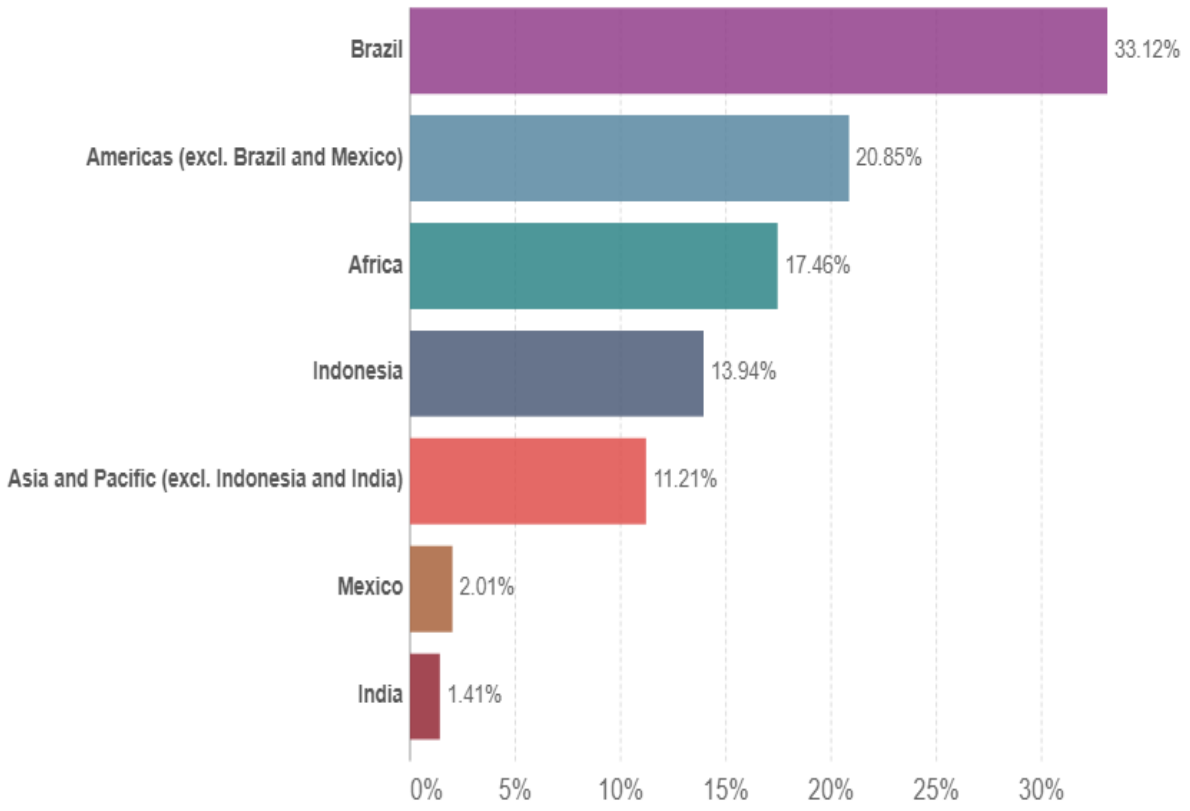
Another valid example would be forest blazes; hundreds of trees are lost each year due to forest fires in various portions of the world. It happens due to extreme warm summers and milder winters. Fires, whether caused by man or nature, results in a massive loss of forest cover.

8. Paper

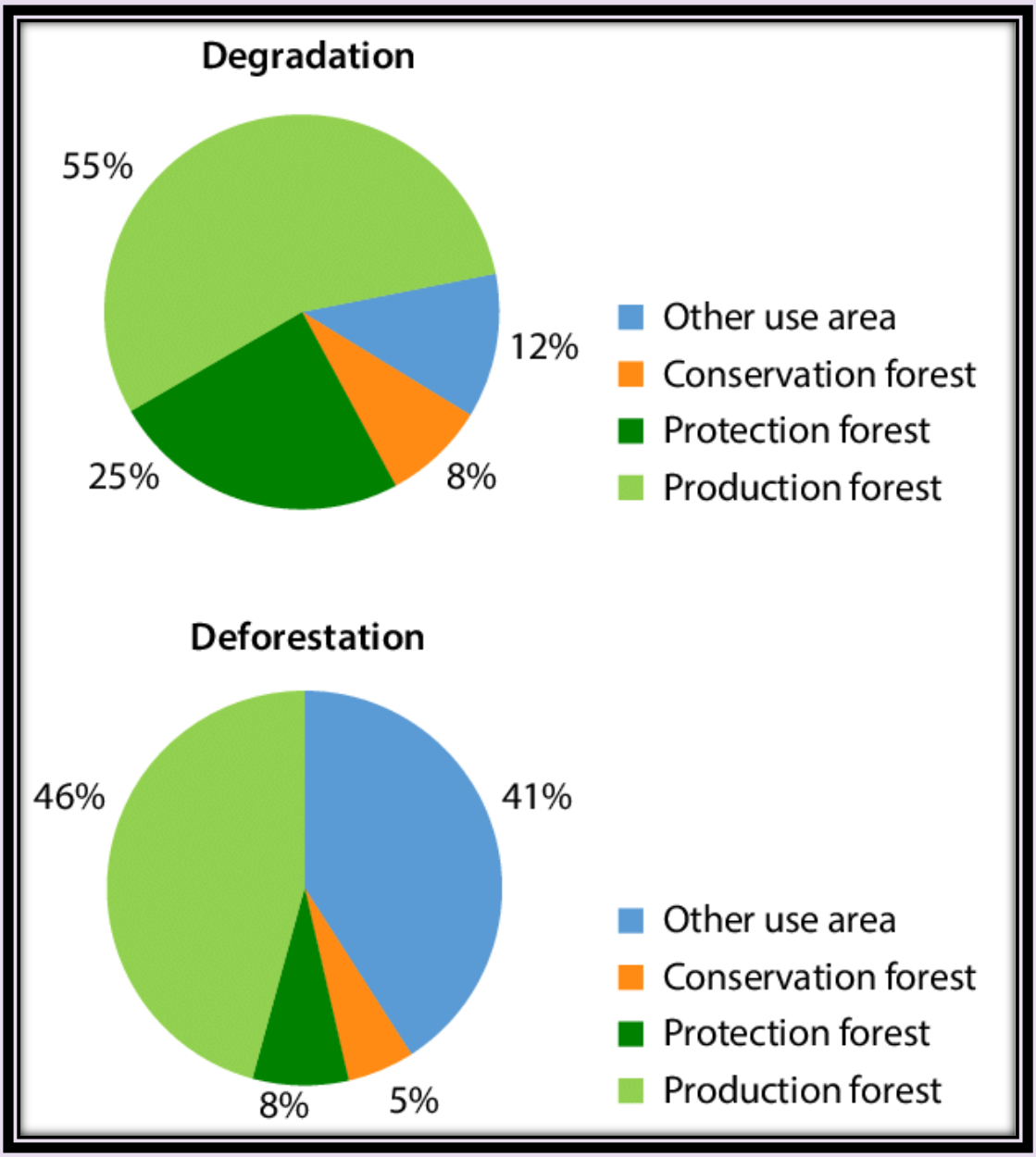
According to the Environment Paper Network, the paper that's thrown away each year accounts for approximately 640 million trees. America, China, Canada, Japan, constitute more than that of the world's paper production, and that is 400 million tons a year. If we recycled, that could save 27.5 million tons of carbon dioxide from going into the atmosphere. We allow the forests to continue to remain as a favorable ecosystem and wildlife habitat if we use recycled paper.

Share of tropical deforestation

Share of tropical deforestation from commodity production – this includes forest clearance for croplands, pasture and tree plantations for logging. It's measured as the annual average between 2010 and 2014.



Source: Pendrill et al. (2019). Agricultural and forestry trade drives large share of tropical deforestation emissions.
OurWorldInData.org/forests • CC BY


Degradation
55%
12%
25%
8%
Other use area
Conservation forest
Protection forest
Production forest
Deforestation
46%
41%
8%
5%
Other use area
Conservation forest
Protection forest
Production forest

6. Biodivesity loss:-

Biodiversity loss, also called loss of biodiversity, a decrease in biodiversity within a species, an ecosystem, a given geographic area, or Earth as a whole. Biodiversity, or biological diversity, is a term that refers to the number of genes, species, individual organisms within a given species, and biological communities within a defined geographic area, ranging from the smallest ecosystem to the global biosphere.

Causes of Biodiversity loss

The main cause of the loss of biodiversity can be attributed to the influence of human beings on the world's ecosystem, In fact human beings have deeply altered the environment, and have modified the territory, exploiting the species directly, for example by fishing and hunting, changing the biogeochemical cycles and transferring species from one area to another of the Planet. The threats to biodiversity can be summarized in the following main points:

- **Alteration and loss of the habitats:** the transformation of the natural areas determines not only the loss of the vegetable species, but also a decrease in the animal species associated to them.
- **Introduction of exotic species and genetically modified organisms:** species originating from a particular area, introduced into new natural environments can lead to different forms of

imbalance in the ecological equilibrium. Refer to, "Introduction of exotic species and genetically modified organisms".

- **Pollution:** human activity influences the natural environment producing negative, direct or indirect, effects that alter the flow of energy, the chemical and physical constitution of the environment and abundance of the species;
- **Climate change:** for example, heating of the Earth's surface affects biodiversity because it endangers all the species that adapted to the cold due to the latitude (the Polar species) or the altitude (mountain species).
- **Overexploitation of resources:** when the activities connected with capturing and harvesting (hunting, fishing, farming) a renewable natural resource in a particular area is excessively intense, the resource itself may become exhausted, as for example, is the case of sardines, herrings, cod, tuna and many other species that man captures without leaving enough time for the organisms to reproduce.

Effects

1. **Ecological effects: -** The weight of biodiversity loss is most pronounce on species whose populations are decreasing. The loss of genes and individuals threatens the long-term survival of a species, as mates

become scarce and risks from inbreeding rise when closely related survivors mate. The wholesale loss of populations also increases the risk that a particular species will become extinct. Biodiversity is critical for maintaining ecosystem health. Declining biodiversity lowers an ecosystem's productivity (the amount of food energy that is converted into the biomass) and lowers the quality of the ecosystem's services (which often include maintaining the soil, purifying water that runs through it, and supplying food and shade, etc.).

Biodiversity loss also threatens the structure and proper functioning of the ecosystem. Although all ecosystems are able to adapt to the stresses associated with reductions in biodiversity to some degree, biodiversity loss reduces an ecosystem's complexity, as roles once played by multiple interacting species or multiple interacting individuals are played by fewer or none. As parts are lost, the ecosystem loses its ability to recover from a disturbance (*see* ecological resilience). Beyond a critical point of species removal or diminishment, the ecosystem can become destabilized and collapse. That is, it ceases to be what it was (e.g., a tropical forest, a temperate swamp, an Arctic meadow, etc.) and undergoes a rapid restructuring, becoming something else (e.g., cropland, a residential subdivision or other urban ecosystem, barren

wasteland, etc.).Reduced biodiversity also creates a kind of "ecosystem homogenization" across regions as well as throughout
the biosphere. Specialist species (i.e., those adapted to narrow habitats, limited food resources, or other specific environmental conditions) are often the most vulnerable to dramatic population declines and extinction when conditions change. On the other hand, generalist species (those adapted to a wide variety of habitats, food resources, and environmental conditions) and species favored by human beings (i.e., livestock, pets, crops, and ornamental plants) become the major players in ecosystems vacated by specialist species. As specialist species and unique species (as well as their interactions with other species) are lost across a broad area, each of the ecosystems in the area loses some amount of complexity and distinctiveness, as the structure of their food chains and nutrient-cycling processes become increasingly similar

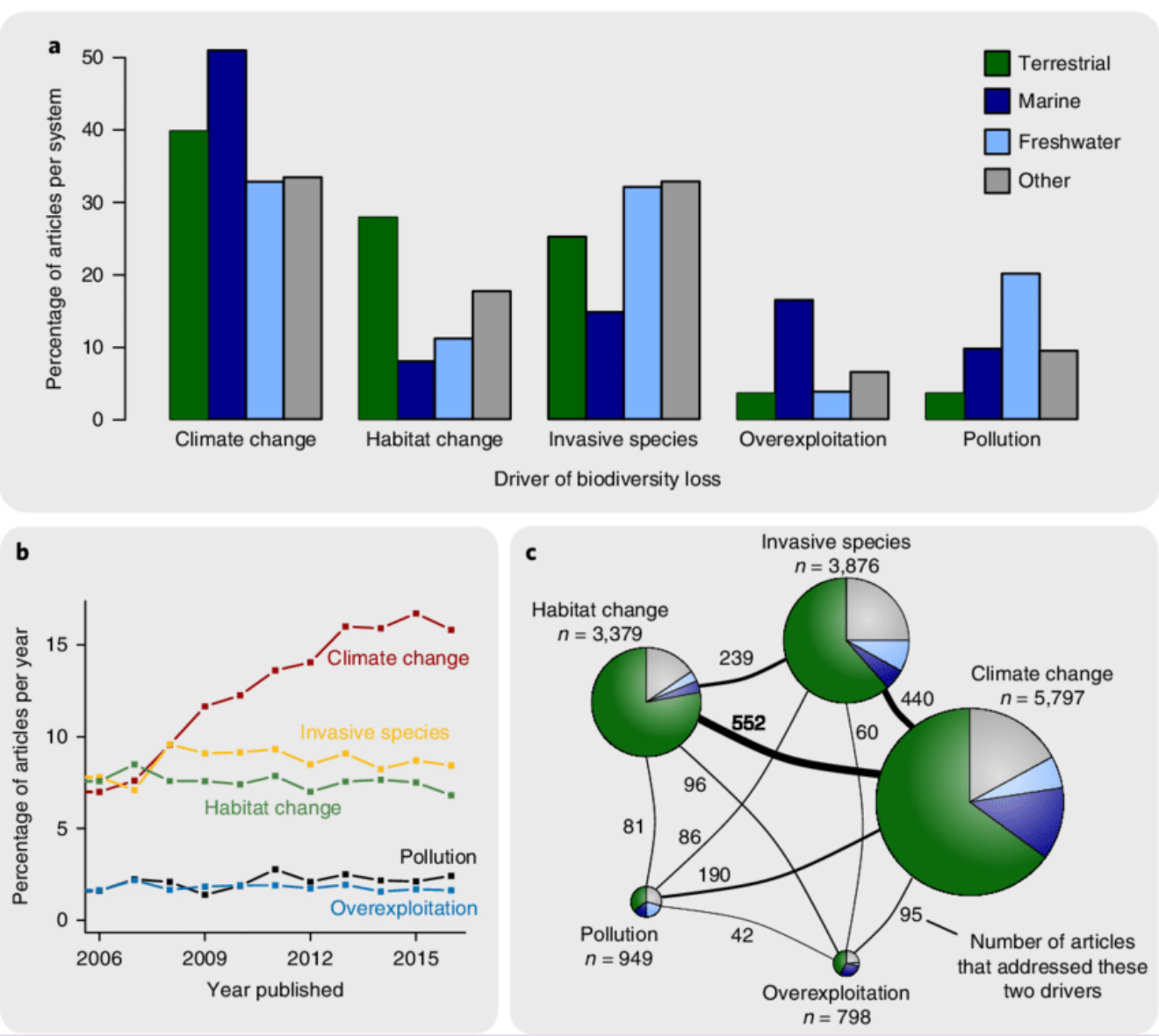
2. **Economic societal effects:** - Biodiversity loss affects economic systems and human society. Humans rely on various plants, animals, and other organisms for food, building materials, and medicines, and their availability as commodities is important to many cultures. The loss of biodiversity among these critical natural resources threatens global food security and the development of new pharmaceuticals to deal with future diseases.

Simplified, homogenized ecosystems can also represent an aesthetic loss.

Economic scarcities among common food crops may be more noticeable than biodiversity losses of ecosystems and landscapes far from global markets. For example, Cavendish bananas are the most common variety imported to non-tropical countries, but scientists note that the variety's lack of genetic diversity makes it vulnerable to Tropical Race (TR) 4, a fusarium wilt fungus which blocks the flow of water and nutrients and kills the banana plant. Experts fear that TR4 may drive the Cavendish banana to extinction during future disease outbreaks. Some 75 percent of food crops have become extinct since 1900, largely because of an overreliance on a handful of high-producing crop varieties. This lack of biodiversity among crops threatens food security, because varieties may be vulnerable to disease and pests, invasive species, and climate change. Similar trends occur in livestock production, where high-producing breeds of cattle and poultry are favored over lower-producing, wilder breeds.

Mainstream and traditional medicines can be derived from the chemicals in rare plants and animals, and thus lost species represent lost opportunities to treat and cure. For example, several species of fungi found on the hairs of three-toed sloths (*Bradypus variegatus*) produce medicines effective against the parasites that cause malaria (*Plasmodium*

falciparum) and Chagas disease (*Trypanosoma cruzi*) as well as against human breast cancer.



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