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EXPONENTIAL GROWTH OF HUMAN POPULATION IS SOLELY RESPONSIBLE FOR THE HABITAT DESTRUCTION AND LOSS OF BIODIVERSITY ON THE MOTHER EARTH

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Abstract

There are a number of clearly defined processes leading to destruction of habitat and loss of biodiversity, but the ultimate cause of all these is the increasing human population. Most endangered species are threatened by numerous factors, but habitat loss worldwide is generally viewed as the single largest cause of biodiversity loss. When humans convert uninhabited areas for agriculture, forestry, urban development, or water projects like construction of dams, hydropower, and irrigation channels, they reduce or eliminate its usefulness as a habitat for the other species that live there.

Biodiversity is the natural variety of living creatures we see around us. It is the variety of all forms of life on this terrestrial ecosystem. High rates of extinction are quickly reducing biodiversity especially in areas with high human population density and growth in the world. The direct and indirect effects of human interference on biodiversity are very challenging. Quantifying loss of genetic diversity is difficult, but it is clear that the extinction of species and declines in their population lead to a loss of genetic diversity. Unfortunately, the majority of the human population growth is seen within the greatest biodiversity hotspots. Scientific studies demonstrates that 87.9 percent of variation in endangered species can be explained by the single factor of human population density.

In history many natural extinctions of species were witnessed, but the current rates of extinction are estimated to be roughly 100- times higher than the typical rates in the fossil record, and this increase of extinction will be 1000- 10,000 times higher in the future.

Keywords: *destruction, habitat, biodiversity, genetic diversity, extinction of species*

INTRODUCTION

Biodiversity is a measure of the variety of forms of life on earth (Kulkarni, 2013). Biodiversity includes not only the plants and animals, but everything we see around us (including ourselves), but also the myriad of microscopic organisms that inhabit our

environment, such as fungi, algae, bacteria and viruses. It exists everywhere: in forests, mountains, deserts, lakes, rivers and oceans (aaee, 1998). It is also present in cities, houses and backyards, on farms and in any human modified environment, as well as around our bodies, on our skin and in our internal organs. About 3 to 100 million species inhabit the Earth (Heywood, 1995). Infact the broader meaning of the term "biodiversity" is a contraction of "biological diversity", and was first coined by *Walter Rosen* for the 1986 National Forum on Biodiversity (Wilson, 1998). However, biodiversity refers to an accumulation of all the species living on the earth. The estimated total number of species on the earth keeps on increases as our knowledge of natural environments improves (aaee, 1998).

By and large, biodiversity provides us with a great source of food, medicines, materials and opportunities. The earth's biological resources are indispensable to human beings for their economic and social development. As a result, it is an universal truth that biological diversity is a global asset of tremendous value to present and future generations. But marine and terrestrial biodiversity on this earth is decreasing due to a wide range of human effects (Secretariat of the Convention on Biological Diversity, 2010).

Following are the major questions of inquiry which are required to be answered in this study:

1. What are the main causes of the destruction of habitat?
2. Why the loss of biodiversity is more in areas of much human population growth?
3. How the increasing human population is responsible for the extinction of species?

HUMAN POPULATION SCENARIO:

On the earth surface the most important element which has shown an exponential growth rate is the increasing human population. This growth results in an increase in the demand for land, food, water, energy and other resources. With the increasing of human numbers, other species and their habitat got diminished. As per the United States Census Bureau the world population is **7.9 billion** as of June 2021. With 4.3 billion inhabitants, Asia is the most populous continent accounting for 60% of the world population. The world's two most populated countries China and India together constitute about 37% of the world's population (See Table-1)**.**

Table-1: Ten most populous countries of the world

Rank	Country / Territory	Population	Approx. % of world population	Date
1	China	1,408,491,560	17.9%	21 Jun 2021
2	India	1,378,452,263	17.5%	21 Jun 2021
3	United States	331,882,204	4.21%	21 Jun 2021
4	Indonesia	269,603,400	3.42%	1 Jul 2020
5	Brazil	220,892,331	2.80%	1 Jul 2020
6	Pakistan	213,300,498	2.71%	21 Jun 2021
7	Nigeria	206,139,587	2.62%	1 Jul 2020
8	Bangladesh	170,875,490	2.17%	21 Jun 2021
9	Russia	146,748,590	1.86%	1 Jan 2020
10	Japan	127,792,286	1.62%	1 Jul 2020

Source: en.wikipedia.org/wiki/World_population

The world population has experienced continuous growth since 1350, when it was near 370 million. This was the period of the end of Great famine which causes Black deaths, The highest growth rates of global population increases above 1.8% per year, during the 1950s, and for longer during the 1960s and 1970s. The global growth rate peaked at 2.2% in 1963 (Wikipedia, 2015), and has declined to 1.05% in 2020. Fig.-1 shows the trend of increasing human population from 1760 to 2050.

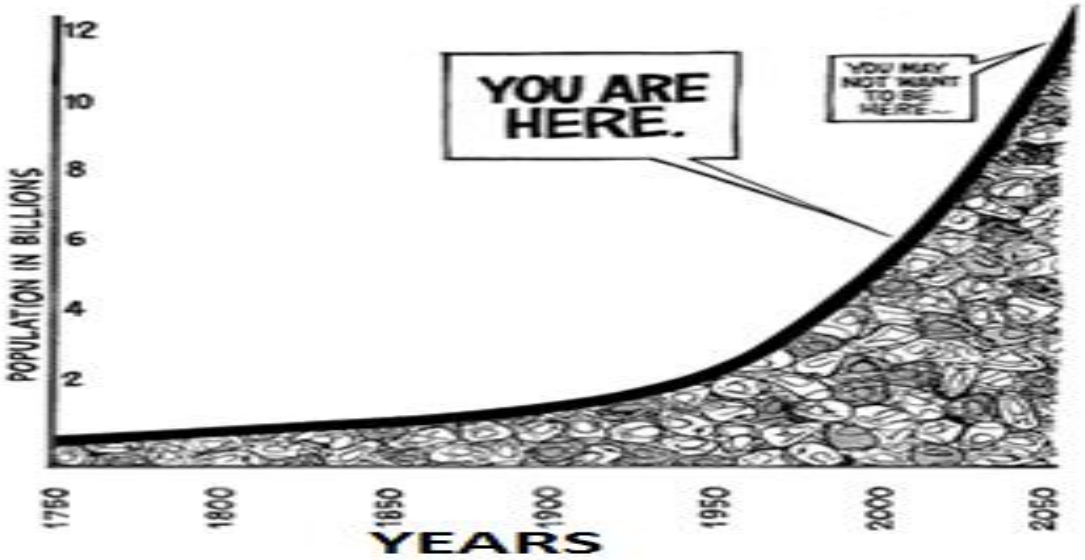
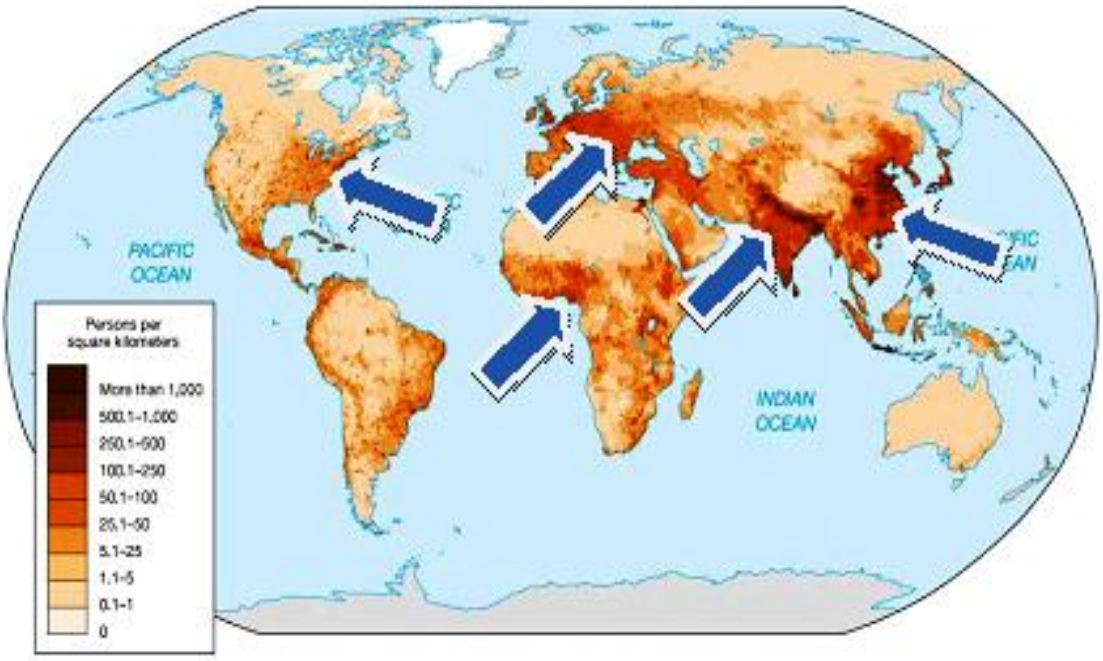


Fig.-1: Trends of Increasing Human Population

POPULATION BY REGIONS

Earth's six continents out of the total seven are permanently inhabited by humans. As per population statistics of June, 2021 (worldometers, 2021), the Asia is the most populous continent, with 4.7 billion inhabitants accounting for 59.76% of the total world population. Africa is the second most populated continent, with around 1.4 billion people, or 16.72% of the world's population. Europe's 748 million people make up 9.78% of the world's population. while the Latin American and Caribbean regions are home to around 660 million (8.42%). Northern America, primarily consisting of the United States and Canada, has a population of around 371 million (4.73%), and Oceania, the least-populated region, has about 43 million inhabitants (0.54%). Though it is not permanently inhabited by any fixed population, Map-1 shows the density of population in the world. The spatial pattern of population density reveals that maximum population lives in South-East Asia and the coastal areas of the world with 3.2 billion (1/2 of the plant) lives and work within 200 kilometres from a coastline and 4 billion (2/3) live within 400 kilometres from the coast.



Map-1: Density of Population in the World

CAUSES OF BIODIVERSITY LOSS:

The main cause of the loss of biodiversity is attributed due to the influence of human beings on the earth's surface. Infact the activities of human beings are solely responsible for the degradation of the environment, and have modified the territorial limits and exploiting the

species directly, such as fishing and hunting. These activities are responsible for changing the biogeochemical cycles and transferring natural species from one area to another on the planet earth.

There are a number of clearly defined processes leading to destruction of habitat and loss of biodiversity, but the ultimate cause of all these is the increasing human population. Human interference with physical environment causes environmental pollution and excessive use of resources lead to destruction of habitat. The combined effect of all these factors resulted in to extinction of species.

PHYSICAL ALTERATION OF HABITAT

One of the greatest sources of loss to the biodiversity is the physical alteration of habitat and this has been resulted through these four processes: **(1) *Conversion*, (2) *Fragmentation*, (3) *Simplification*, and (4) *Intrusion***

(1) *Conversion*: It is when natural areas are converted to agricultural farms, construction of housing subdivisions, shopping malls, marinas, and industrial centers.

(2) *Fragmentation*: The division of a landscape is divided into different patches of habitat by road construction, agricultural lands, or residential areas.

(3) *Simplification*: Human use of habitats often simplifies habitat. Removing of fallen logs and dead trees from the forests are used for firewood.

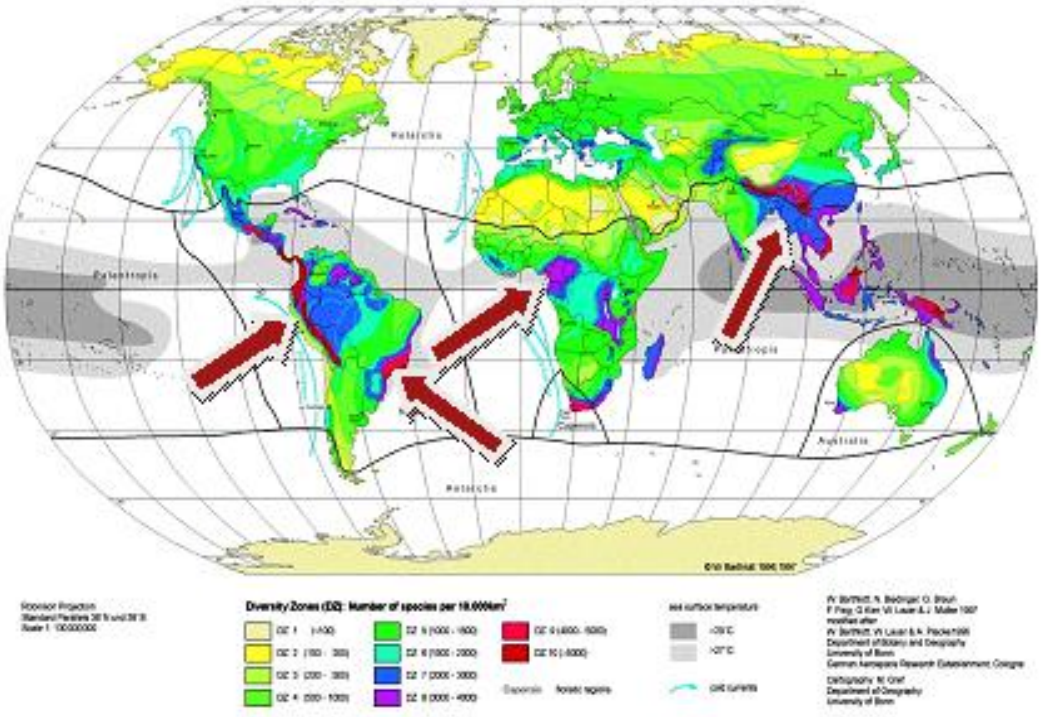
(4) *Intrusion*: Habitat destruction has already been responsible for 36% of the known extinctions and is the key factor in the currently observed population declines of the species. Natural species are adapted to specific habitats, so if the habitat changes or is eliminated, the impact on species is also seen considerably.

POPULATION CONNECTION AND LOSS OF BIODIVERSITY

Earlier losses of biodiversity are the result of the expansion of the human population over the globe. Continuing human population growth will further degrade natural habitats, thereby, causing inevitable loss of more wild species and additional declines in their populations. Habitat destruction is the single most important cause of the loss of biodiversity and is directly related to human population growth (See Map-2).

The key aspect to bring down the further loss to biodiversity lies in bringing down the human population growth rate. If the human population increases to 10 billion, as imagined by some demographers, the consequences for the natural world will be frightening.

It is a hard fact that most of the destroyed habitats are those which contain the highest levels of biodiversity. Lowland tropical wet forests are such habitats, where biodiversity loss is very hight due to clearing, selective logging, and burning.



Map-2: Global Biodiversity, Species Numbers of Vascular Plants

EXTINCTION OF SPECIES

Extinction of species is a natural process that has occurred for millions of years, but the rate of extinction has increased dramatically in recent years due to the impacts of human beings. The rate of change is perhaps more damaging than the effects of the changes itself. There organisms didn't get any time to adapt themselves to this constantly-changing environment. It has been estimated that if current environmental practices are constantly going on without any change, we may lose 50% of all types of species globally.

Extinction on such a large scale may also be catastrophic to the human beings. If we look at the former large extinctions in the earth's history, we have witnessed that millions of years have been taken by the earth to recover. To consider this fact, it is many times longer than humans have actually been on the earth. The main difference now is that, instead of having a mass extinction in one particular environment as witnessed in the past, now we are losing huge numbers of species in several key habitats at the same time. Not only numerous animal and fish species are depleting by us, but we are also depleting large portions

of our terrestrial plant species. With extinction of so many plant species, the resource base will not be left upon which to generate a recovery of animal species including humans.

As per the latest update of the IUCN red book, more than 71,000 species across the world have been assessed so far (See Table-2).

Table-2: Number of Species Assessed in the IUCN Red List, by Category

Category	Number
Total species assessed	71,576
Total threatened species	21,286
Extinct	799
Extinct in the Wild	61
Critically Endangered	4,286
Endangered	6,451
Vulnerable	10,549
Near Threatened	4,822
Lower Risk/conservation dependent	241
Least Concern	32,486
Data Deficient	11,881

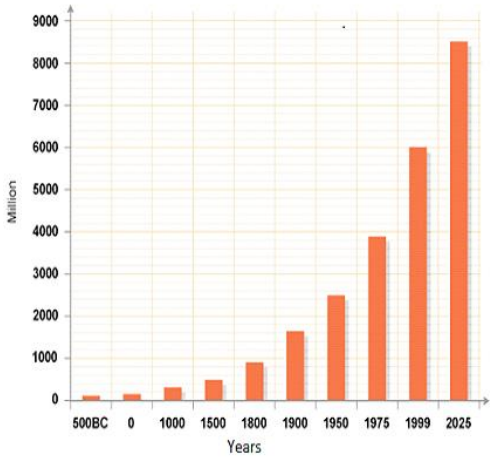
Source:http://www.theguardian.com/news/datablog/2013/nov/26/iucn-red-list-threatened-species-by-cstegory-statistics

The fact that 11,881 species are deemed data deficient shows the difficulties faced in trying to analyse the status of such a variety of species at such a level. The IUCN state that although not all of the world's species have been assessed, the red list provides a useful snapshot of what is happening to species today and highlights the urgent need for conservation action. Of 71,576 species that have now been assessed, 21,286 are threatened with extinction. Species listed as critically endangered, endangered or vulnerable are collectively described by the IUCN as threatened. The Table-2 above shows what proportion each of the category's make-up of the total number of threatened species. The IUCN assign species to one of eight categories of threat based on whether they meet criteria linked to population trend, population size, structure and geographic range (IUCN, 2013).

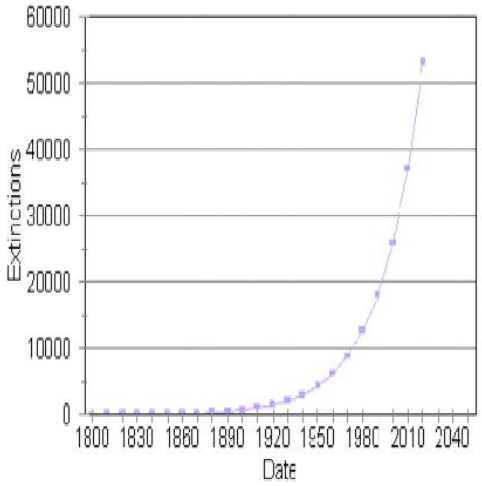
POPULATION CONNECTION AND EXTINCTION OF SPECIES:

As the human population is growing at an exponential rate, the extinction of species also increasing in the same manner.

Pattern of Accelerating Population Growth (including the predicted population for 2025) from 500 BC to 2025AD

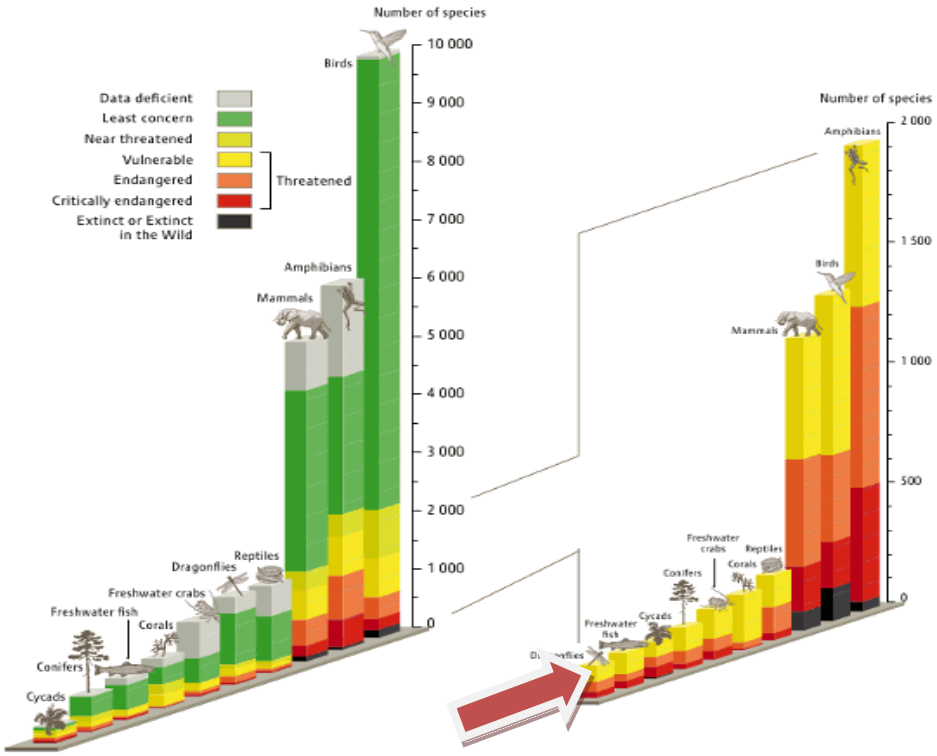


Extinction Rate Species Extension Since 1980



THREAT STATUS OF COMPREHENSIVELY ASSESSED SPECIES BY INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN):

As per the IUCN assessment, amphibians are the most at risk, while corals have had a dramatic increase in risk of extinction in recent years. The latest reports estimate that more than a million species will be lost in the next 50 years, greatly reducing the world's biodiversity (Secretariat of the Convention on Biological Diversity, 2010).



Source: IUCN as compiled by Secretariat of the Convention on Biological Diversity (2010, May), *Global Biodiversity Outlook 3*.

CONCLUSION

One of the greatest threats for the survival of the species are the changes, loss and fragmentation of their habitat caused. Our constant development means that we must destroy natural ecosystems in the name of progress. Sometimes our development does not destroy an ecosystem but simply decreases its size. This in itself can be destructive. Many animals have to maintain a certain range in order to live. If they do not have access to this area, their lives are significantly altered. Closer quarter causes more competition between species, and this may lead to the eventual extinction of one or more species.

Despite knowing about biodiversity importance for a long time, human activity has been causing massive extinctions. As the *Environment News Service*, reported back in August 1999, the current extinction rate is now approaching 1,000 times the background rate and may climb to 10,000 times the background rate during the next century, if present trends continue a loss that would easily equal those of past extinctions.

A major report, the *Millennium Ecosystem Assessment*, released in March 2005 highlighted a substantial and largely irreversible loss in the diversity of life on Earth, with some 10-30% of the mammal, bird, amphibian and coral species threatened with extinction, due to human actions.

Humans require a great deal of resources and space and have not had a record of sharing. The earth is losing biodiversity at a rate not seen since the mass extinction that killed the dinosaurs 65 million years ago. However, 25% of the earth's bird species have been driven to extinction by humans especially on islands. While 11% of birds, 18% of mammals, 5% of fish and 8% of plants threatened with extinction. Our increasing numbers will certainly increase the rate at which animals and plants are lost.

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