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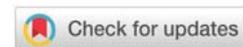
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## Review Article

# The principal factors responsible for biodiversity loss

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## Abstract

The exclusive attribute of the planet earth is the presence of life, and the remarkable trait of life is the variety or the diversity, which is also known as biodiversity. As per ScienceDaily news 2020, it is assessed that about 15 million distinct species are present on earth and only 2 million of them are presently recognized by science. Biodiversity is diminishing at an alarming pace. It is our responsibility to protect biodiversity as efficaciously as possible. In the previous few years lot of emphasis has been laid on establishing that biodiversity loss is one of the tremendous problems which can threaten even the very own existence of human race on earth, if left neglected. It is high time, we put our sincere efforts in understanding the underlying causes responsible for the loss of various species on our planet. The present review discusses the principal factors responsible for the loss of biodiversity such as pollution, habitat loss, hunting, introduction of invasive species, overexploitation of preferred species, climate change and natural disasters.

## Introduction

Biodiversity in most simple terms means the diversity of life. The internationally agreed definition as per Convention on Biological Diversity (CBD) is “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species of ecosystem” [1].

Why is Biodiversity such a big deal? The presence of complexity of life or Biodiversity on the planet earth determines the capability of nature to provide the resources required for human existence. Quoting in other words, the mere sustenance of humanity depends on Biodiversity. Even more, the poor people are affected the most by biodiversity loss as they directly depend on biodiversity to meet their daily needs for subsistence. Biodiversity secures various resources for our survival from uncontaminated water, air, and food to traditional and modern medicines [2] Biodiversity loss is not only an environmental problem, but it would also eventually turn to developmental challenge if left neglected. Development boosts is at higher risk due to loss of biodiversity

loss. The uninterrupted biodiversity loss could lead to less nutrition, decreased wild foods, impoverished pollination, and subordinate and less irrepressible agriculture systems [3]. This can further result in more vulnerability to Agri-chemicals, decreased traditional medicines access, less chance for development of drugs, further leading to surpassing disease strains [4].

### Principal causes for the loss of variety of life on earth

The numerous factors are responsible for the loss of Biodiversity (Figure 1) such as pollution, habitat loss, hunting, introduction of invasive species, overexploitation of preferred species, climate change, and natural disasters.

### Pollution

Living organisms have developed over an extended period, however they strive to adopt to existence on a polluted planet. Air pollutants such as soot, dust, ammonia, or carbon dioxide can directly and indirectly influence biodiversity.

### Air pollution

Air pollutions influence the respiratory apparatus of the

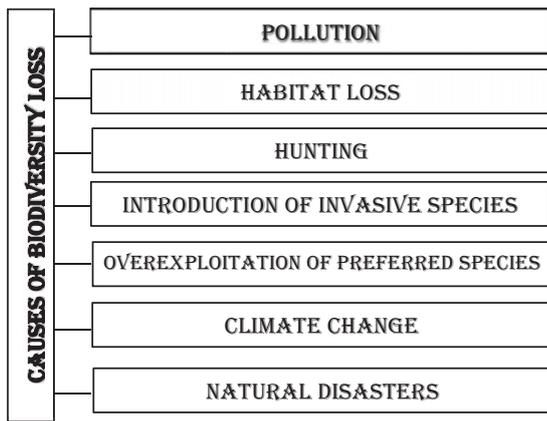


Figure 1: The causes of Biodiversity loss.

animals and negatively impact their well-being including the egg laying capability and behavioral alterations [5]. Air pollution is also known to influence the reproductive ability of the animals and hence success in breeding [6]. The indirect influence of air pollution on animals is difficult to evaluate as it is difficult to examine in controlled environment. The tremendous discharge of greenhouse gases such as nitrous oxide, carbon dioxide, methane is swiftly modifying the climate of the earth. The animals and plants find it difficult to adjust and this influence the biodiversity. Acid rain is other pollutant, and it causes enhanced build-up of the mucus in fish gills leading to suffocation. Soil prone to acid rain has diminished activity of microbes [7]. This influences the food chain and other forms of life too.

### Water pollution

Water pollution had detrimental effect on biodiversity. Chemical fertilizers generally contain nitrogen and phosphorous and are added to soil to boost the crop productivity. Nitrogen and phosphorous sweep away from the soil to the water bodies or underground. The presence of these nutrients in the water bodies lead to eutrophication or excessive plant growth. Eutrophication causes the depletion in the oxygen level which is deleterious for biodiversity. Fish and other aquatic animals die because of lack of dissolved oxygen in water. Alike fertilizers, pesticides may also accumulate in water bodies. The pesticides negatively affect non-flowing waterbodies such as lakes and ponds given the fact that fertilizers are not washed away and animals in water bodies have difficulty in reproducing [8].

Various anthropogenic activities such as production of cement, cars; mining etc. lead to the introduction of heavy metals such as arsenic, cadmium, mercury into the water bodies [9]. Heavy metals affect the behavior as well as the survival rates of aquatic animals specially fish. Further, events such as oil spills greatly impact the wildlife specially in the deeper oceans. The birds and the larger animals display the apparent hostile effects. Oil spills cause disruption of the animal senses, suffocation, impair the vital organs of the organisms, reduction in growth rates and induce the higher mortality of the larvae [10]. Like the oil spills, plastic stays in the environment for longer time-period and hence influence the wildlife. Lager

animals particularly turtles fail to regurgitate causing internal injuries leading to death. It has been noticed that the seabirds like Layson albatross upon consumption of plastic die prior to fledging the nest. Microplastics in the environment also impact the survival rate of larvae, diminished food consumption and gradually weight loss in aquatic animals [11].

### Soil pollution

Soil pollution is another factor adversely affecting biodiversity. Soil contaminated with heavy metals greatly impact the welfare of the microorganisms essential for the sustaining life of the living organisms. The excess of heavy metals present in the soil are not easily broken down and are accumulated by plants [12]. The over-use of fertilizers, pesticides and antibiotics used in agriculture is also very deleterious for the biodiversity. These agricultural pollutants such as nitrogen from fertilizers alter the pH and the nutrient level of the soil. The enhanced presence of nutrients in the soil causes the vigorous growth of grass species, leading to stifle in the growth of wildflowers, essential for bees and other pollinating insects [13]. This greatly impacts the biodiversity.

Light pollution such as the use artificial light too has negative impact on the biodiversity. The late-night streetlights, lights from the buildings, vehicles headlights etc. have specially affected the nocturnal animals such as bats. The feeding activity of bats has decreased and their emergence from roosts have been found to be delayed in artificial lights. The behavior of the moths is also largely affected by the light pollution. Moths are prey for other species and pollinators of many species [14].

Noise pollution has also been reported to have negative impact on biodiversity. The studies have reported that birds in noisier areas begin laying less eggs as it masks the important territorial calls birds make [15]. The machinery noise in Brazil at a mining site was found to impact wildlife. Species numbers declined at sites nearer the mine and were higher farther away [16].

### Habitat loss

The hefty menace to biodiversity and the vital discernment for species extinction is habitat loss. This is a grave issue both for wildlife as well as humans. Habitat and wildlife are causally related. For the active working of the ecosystem to reap the benefits, for which we confide in for our existence, we cannot risk neglecting the wildlife. The destruction, degradation and fragmentation of habitat are the three predominant categories of habitat loss [17].

The habitat destruction is the massive destruction of the natural habitat of the species that it becomes incapable of upholding the native ecosystems and the species. This ultimately results in species extinction i.e., biodiversity loss. The cutting the forests for preparing the fields for agricultural use, filling the wetlands and mowing fields for creating residential or commercial sites, harvest of the fossil fuels, etc. are all examples of habitat destruction [18].



Development of agricultural practices, reduced resources such as food, water, air quality, mining, pollution, logging, catastrophic fishing activities, activities related to urbanization, and the interruption of processes related to ecosystem are the predominant elements of degradation of habitat. The habitat degradation affects both the species dwelling in the habitat and the humans both. The erosion, depletion of nutrients and desertification cause the further loss of the degraded land [19].

Habitat fragmentation is another gigantic issue arisen due to human developmental activities. Human beings for the purpose of development and to meet the never ending needs to expand even at the cost of extinction of their own species converts large wild areas into smaller fragments of land. These split up areas break down the habitats of the animal and plant species, isolate animal communities, compressing genetic diversity [20].

### Hunting

Hunting is the root cause of extinction of large numbers of animals holding position in food web. Due to this, the various species in the region are adversely affected as they face food scarcity or complete food unavailability compared with the normal situation. Hunting is extensive operator of loss of biodiversity. Hunting activities exert a considerable burden on wildlife, provoking immense downturn of wildlife and leading to disturbed and inefficient ecosystems. In most extrude situations, overhunting can lead to the elimination of large mammals in contrarily healthful unharmed habitat, compelling transition in forest structure [21].

### Overexploitation of preferred species

Overexploitation is the collection of species from their natural habitat at higher estimates than the native communities can retrieve. Presently, nearly one third of the earth's vertebrates facing extinction are vulnerable due to overexploitation. Extreme fishing and hunting are the examples of overexploitation. Passenger pigeons which were once very commonly seen are the sufferers of overhunting. Similarly, various creatures both plants and animals are collected to be used as pets, trophies, or souvenirs. Such collections are illegal and usually called as poaching [22].

Overexploitation of plants which have medicinal values have eventuated in their loss from native habitats. Many plants such as *Drosera sp.*, *Gnetum sp.*, pitcher plants, *Psilotum sp.*, *Napenthes Khasiana* etc. are relentlessly hunted and collected for academic tutoring and laboratory experiments. Similarly, various orchids have also been overexploited [23].

### Climate change

The biodiversity and climate change are strongly associated. Even though the climate has consistently altered during the whole of earth's history with ecological communities and species evolving and extinguishing, accelerated climate change disturbs ecological systems and species capability to acclimate and hence the loss in biodiversity enhances. The swift climate change, stimulating biodiversity loss jeopardize human

interests and security for clean water, air, medicines, and additional natural resources we depend on, would be difficult to attain due to reduced or vanished flora and fauna they are obtained from. Climate change, beside other components such as habitat loss, land degradation, hunting, overexploitation of certain species etc., is turning up as a high threat to biodiversity on earth [24].

### Invasive species

The introduction of invasive species is the tremendous threat to biodiversity crisis. The species, which is not native to the ecosystem, arrives or is introduced mostly via humans in the new ecosystem and start to pullulate is called as invasive species. Such species are detrimental as they effect the ecosystem disproportionately compared to any other species. Most of the new species introduced in the ecosystem do not become invasive, but few of them turn into invasive species and adversely affect the ecosystem [25]. The invasive species wrack up the native ecosystem in many ways such as they modify the habitat, import pathogens, are herbivorous on plants in native ecosystem, lead to decline of genetic diversity by hybridizing with natives, for the resources they directly compete with and prey on the native species [26]. The prevention of biodiversity loss is a huge developmental issue as the climate change and hence demands further ardent commitment and response from the communities [27].

### Natural disasters

Natural catastrophes, for instance volcanos, wildfires, floods, hurricanes, draughts, epidemics, tsunamis etc. cause a heavy loss of biodiversity [28]. In humid tropical areas such as central Africa, eastern and northern Australia, some areas of South America floods are common. The tropical areas harbor lot of vegetation and vast number of animals survive in the vegetation. Due to flooding, large amount of nutrients from the soil gets washed away. Drought too led to dry soil and decline in the level of water table [29]. In this situation, both animals as well as plants suffer.

Similarly, wildfires in the thickly wooded forests and earthquakes significantly disrupt the life of the organisms and thus affecting biodiversity. Volcanoes frequently wreck animals and plants in the adjoining areas. Epidemics occasionally wipe out vast majority of the population. The occurrence of epidemics in nature is normally restricted to certain population of animal or plant since the pathogen is usually species specific [30].

### Conclusion

The primary cause for biodiversity loss is due to the impact of mankind on world's natural system. The people have profoundly modified the environment. Several factors discussed in the review such as pollution, hunting, invasive species, habitat loss and degradation, exploitation of natural resources etc. are the conducive factors for biodiversity loss. The phenomenon of biodiversity loss has severe negative impact on all the living organisms including human beings. It is our responsibility to save our planet and take some crucial steps to



prevent the loss of biodiversity. This is highly significant if we wish to secure an inhabitable planet for next generation and for all the plants and animals.

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