



**GLOBAL WARMING: CAUSES AND IMPACT ON HEALTH, ENVIRONMENT AND THE BIODIVERSITY CONSERVATION**

**Rajesh Kumar Verma<sup>1</sup> and Kalpana Soni<sup>2</sup>**

<sup>1</sup>PG Department of Zoology, Agarwal PG College, Jaipur (Raj.)

<sup>2</sup>HOD, PG Department of Zoology, Raj Rishi Govt. PG (Autonomous) College, Alwar, India

Corresponding Author E-mail: [rkzoology@gmail.com](mailto:rkzoology@gmail.com)

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**Abstract**

As atmospheric concentrations of greenhouse gases like carbon dioxide and chlorofluorocarbons rise, the Earth's surface temperature rises, a phenomenon known as global warming. A buildup of atmospheric pollutants like carbon dioxide (CO<sub>2</sub>) and others absorbs solar radiation and sunlight that has reflected off the Earth's surface, leading to global warming. Pollutants like these, which may cling to Earth's atmosphere for decades or even centuries, prevent the radiation from escaping into space, leading to an increase in global temperatures. Greenhouse gases are those that trap heat; the term "greenhouse effect" describes the impact of gases such carbon dioxide, methane, nitrous oxide, water vapour, and synthetic fluorinated gases. Many species of plants and animals will see their habitats disappear as a result of the climatic shift. Many species go extinct because animals are forced to leave their native habitats. This is just one more way that biodiversity is being negatively affected by global warming. The term "biodiversity" refers to the wide range of species and their variations found in many habitats, such as those found on land, in water, and in deserts. A planet's biodiversity is a measure of its abundance and variety of living forms. It is the planet's most intricate and significant feature. Life could hardly persist in a world devoid of biodiversity. One measure of biological diversity is the variety of species present in an environment, as well as the frequency with which each species occurs. Various degrees of organismal organization are also mirrored in it. Biodiversity is important for the environment and the economy. Food, shelter, fuel, clothes, and a host of other necessities are all provided for by it. Tourism is another source of revenue for it. Therefore, in order to maintain a livelihood throughout time, it is crucial to possess a solid understanding of biodiversity. In spite of biodiversity's advantages, the risks to species and ecosystems are growing at an alarming rate, and almost all of these problems stem from human waste of biological resources, which is in turn caused by climate change, pollution, and incompetent institutions. Preserving biodiversity is crucial for achieving equity both within and between generations. Reforestation, botanical gardens, national parks, biosphere reserves, germplasm banks, and the use of breeding and tissue culture techniques as well as social forestry to reduce pressure on forest resource extraction are some of the current biodiversity conservation measures.

**Keywords :** Global Warming, Biodiversity, Conservation, Ecosystem, Reforestation.

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**Introduction**

A slow but noticeable rise in average surface temperatures around the world is known as global warming. Over the last hundred or so years, people have noticed this occurrence. Because of this shift, the Earth's weather pattern is no longer predictable. The idea of global warming is divisive, yet scientists have shown enough evidence to prove that Earth's temperature is indeed increasing. Numerous factors contribute to the warming of the planet, which in turn harms flora and fauna. These reasons might originate in nature or be the result of anything humans have done. Recognizing the detrimental effects of climate change is crucial for finding solutions.

**Causes of Global Warming**

Following are the major causes of global warming:

**(A) Man-made Causes of Global Warming**

- ❖ Deforestation
- ❖ Use of Vehicles
- ❖ Chlorofluorocarbon

- ❖ Industrial Development
  - ❖ Agriculture
  - ❖ Overpopulation
- (B) Natural Causes of Global Warming-**
- ❖ Volcanoes
  - ❖ Water Vapour
  - ❖ Melting Permafrost
  - ❖ Forest Blazes

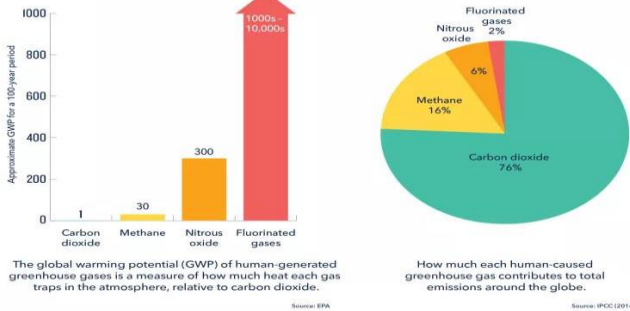
**Consequences of Climate Change**

The main consequences of global warming are as follows:

**Heating the Earth**

Because of human-caused global warming, the Earth's surface temperature has risen dramatically. The Earth's surface temperature has risen about one degree since the year 1880. The melting of glaciers has intensified as a consequence, raising sea levels. Coastal locations could be hit particularly hard by this.

### How Greenhouse Gases Warm Our Planet



#### Risks to the Natural Environment

Damage to coral reefs caused by climate change threatens the survival of many species of marine and terrestrial organisms. The already precarious situation of coral reefs has become much worse due to the rise in global temperatures.

#### Environmental Shift

A shift in the weather pattern has resulted from global warming. Droughts and floods occur in different parts of the world. The phenomenon known as global warming has caused this climatic imbalance.

#### Disease Transmission

Changes in the distribution of both heat and humidity are a direct result of climate change. Because of this, disease-carrying mosquitoes have been able to relocate.

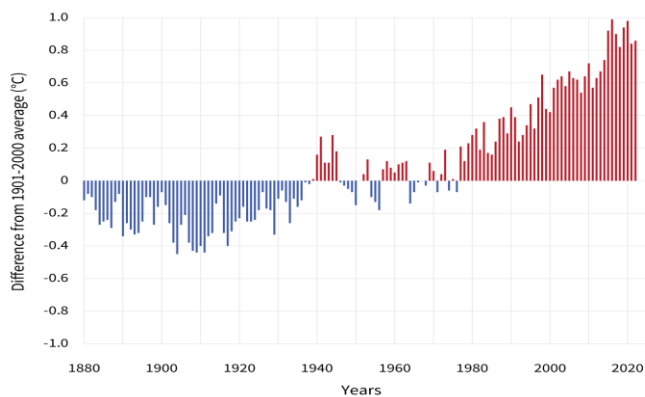
#### High rates of death

The average number of casualties is likely to rise as the frequency of natural disasters like floods and tsunamis rises. Additionally, the spread of diseases can be a consequence of these types of catastrophes, further threatening human life.

#### Natural habitats are being lost.

Many species of plants and animals will see their habitats disappear as a result of the climatic shift. Many species go extinct because animals are forced to leave their native habitats. This is just one more way that biodiversity is being negatively affected by global warming.

### GLOBAL AVERAGE SURFACE TEMPERATURE



#### Ecosystem perspective

The term "biodiversity" refers to the wide range of living forms found in any given location, including not just plants and animals but also fungi, bacteria, and other microscopic creatures. Like a complex web, these species and organisms rely on one another in ecosystems to keep things in check and provide a home for life. Natural processes and, more and more, human interaction have molded the biodiversity that exists today over billions of years. All living things are interconnected in its web, and humans are no exception. Approximately 2.1 million species, primarily comprising of tiny animals like insects, have been recognized thus far.

Despite UNEP's estimations ranging from 9.0 to 52 million species, scientists believe that the true number is closer to 13 million (Mora et al., 2011). Varieties of crops and breeds of cattle are examples of examples of genetic variations within species that contribute to biodiversity. Every person and every species is defined by their chromosomes, genes, and DNA, the fundamental components of life. Agricultural landscapes, forests, marshes, mountains, lakes, rivers, and deserts are just a few examples of the many ecosystems that make up biodiversity. All forms of life, including humans, coexist in ecosystems and influence one another and their surrounding physical environment.

#### Thus, biodiversity is examined at three main levels:

**1. Variegated gene pool:** Species diversity refers to the genetic variation within a given species. Even among members of the same species, there is a remarkable lack of uniformity. As an example, within the human species, there is a great deal of variation from one individual to the next. There is a tremendous deal of diversity among people who live in different places.

**2. Variation in species:** It refers to the variety of life forms found in a certain area. The quantity and dispersion of species are represented by it. A region's species richness is highly conditional on its unique ecosystem. As an example, it is well knowledge that societies located near bodies of water tend to have a more diverse array of animals than those located farther inland.

**3. Variety in ecosystems:** It characterizes the variety of ecosystems found in a specific area. A wide range of life forms can be observed in various environments, such as mangroves, rainforests, deserts, and so on.

The diversity of the biosphere's habitats, biotic groups, and ecological processes is relevant to this. The planet's biodiversity is not uniformly distributed. And it's the tropical one that's the richest. It appears that the warm weather and high primary productivity are the reasons why terrestrial biodiversity is typically highest around the equator (Gaston, 2000; Field et al., 2009). The mid-latitudinal belt and the coasts of the Western Pacific, where the sea surface temperature is highest, are the two ocean regions with the greatest concentrations of marine species. According to Tittensor et al. (2010), species diversity exhibits a latitudinal gradient. Myers et al. (2000) found that biodiversity tended to congregate in hotspots. McPeck et al. (2007) found that biodiversity had been increasing over time, although Robosky (2009) predicted that this increase will likely slow down in the future.

#### The value of biodiversity for society

The following are some of the natural ways in which biodiversity contributes to human well-being:

Agricultural supplies, food, medicine, industrial raw materials, and other productive commodities were sourced from biodiversity.

According to the International Union for the Conservation of Nature (2012), over sixty wild species have contributed genes for increased nutrition, insect resistance, and crop output to thirteen of the world's most important crops.

Roughly 7,000 plant species have been utilized for human nutrition since agriculture started approximately 12,000 years ago. Some 200 million people rely on wild species for some portion of their food, even though most people rely on domesticated species for their sustenance. On their own, fisheries provide at least 15% of the animal protein that people eat. By supplying resources to aquaculture and cattle

sectors, fisheries indirectly contribute to increased food production. Amphibians are 'hopping pharmacies' that help find novel medications, they're an indication of environmental health, and they play an important role in ecosystems. Despite this, 41% of the world's amphibian species are in danger of going extinct. In both conventional and alternative medicine, over 70,000 distinct plant species are utilized. Bacteria are the source of almost all of our antibiotics, including the cholesterol-lowering strain and the widely used penicillin. Research has shown that the chemical taxol, which is derived from the Pacific yew, can kill cancer cells. Pit vipers (*Bothrops jararaca*) are the source of angiotensin-converting enzyme (ACE) inhibitors, some of the most powerful medications used to treat hypertension. The functions and processes of natural systems that facilitate human activity are known as ecosystem services (Singh et al. 2006). The role of biodiversity in ecosystem function and the services they offer is significant. A variety of biomes rely on biodiversity for long-term carbon sequestration, which helps to reduce the impact of climate change. The sequential balance of carbon dioxide and oxygen is sustained by biodiversity. Global warming and an increase in the frequency and severity of natural disasters are consequences of human-caused atmospheric CO<sub>2</sub> accumulation and ozone layer destruction. Carbon storage capacity of coastal ecosystems, including mangrove forests, can be up to five times higher per square kilometer than that of fully grown tropical forests. According to the International Union for the Conservation of Nature (2012), these regions are losing land at a rate three to four times that of forests, which is leading to the release of large quantities of carbon dioxide into the air and water and so accelerating global warming. Control of metabolic processes, for instance." Air, nitrogen, water cycles, and so on. Biochemical cycles are incomplete without biological resources, which serve as critical media in these cycles. Decomposition is essential for the absorption and breakdown of pollutants and waste materials, as seen in food webs and chains, where energy flows through creation, consumption, and decomposition. Decomposition cleans our environment by converting garbage into various types of biodiversity, thus there is no waste in an ecosystem. The control and management of the global climate at all scales, from the local to the micro, by manipulating variables including temperature, precipitation, and air turbulence. Ecosystem resilience and disaster risk reduction/peace-building methods are both supported by biodiversity. Wetlands, mangroves, and forests are vital in mitigating the effects of natural disasters including tsunamis, floods, and droughts. Coral reefs offer a variety of valuable ecosystem services, including natural hazard management, tourism, genetic material and bio-prospecting, and fisheries, which can generate up to US\$331,800 per square kilometer per year (CBD, 2014). By serving as wind breaks and flood barriers, among other functions, the protective services of biodiversity shield humans from dangerous weather conditions.

Pollination by insects (honey bees), bats, and birds is directly or indirectly responsible for producing 87 of the top 113 food crops, which accounts for at least one third of the world's food supply. The pollination service that insects perform is valued at around US\$ 190 billion annually for the world's primary food crops (CBD, 2014). The variety of pollinating insects, which are vital to plant reproduction, has been decreasing on a global scale. Wild species play a crucial role

in controlling pests. Some of the most common animal pests in forests and agricultural areas are preyed upon by birds, snakes, toads, and bats. The following ways in which wild species enrich our understanding and pleasure of nature:-

- As a kind of recreation, such as hiking and bird viewing;
- a) Activities involving spotting, such as mushroom picking, sport fishing, diving, and hunting;
- b) Experiencing nature through sight, sound, or touch;
- c) Pure delight as shown in cultural artifacts, such as stuffed animals and dolls.

### **Disappearance of Species**

There appears to be no letup in sight in the rate of biodiversity loss and associated environmental changes, which is currently at an all-time high. Humans have drastically changed and impacted almost every ecosystem on Earth, and they are constantly converting more and more of it for agricultural and other purposes. The numbers and distribution of many plant and animal species have decreased. Although the extinction of certain species has always been a part of Earth's history, the pace at which it is happening now is at least 100 times faster than it would be in the absence of human interference. Many different factors contribute to the dwindling biodiversity. Any element, whether naturally occurring or caused by humans, that alters an ecosystem in some way is considered a driver. Every process in an ecosystem is undeniably impacted by a direct driver. To achieve a more widespread effect, an indirect driver modifies one or more direct drivers. Changes to habitats, rising temperatures, overexploitation of exotic species, and pollution are major direct forces influencing biodiversity.

### **Key Risks to Biodiversity**

Any process or occurrence, whether caused by nature or by humans, that is expected to have negative consequences on the status or sustainable use of any aspect of biological diversity is considered a threat. Overexploitation of biological resources, land use change, pollution, invasive species, climate change, and altered and destroyed habitats are some of the main causes of biodiversity's fast decline. Both naturally occurring and man-made variables have a tendency to reinforce one another.

### **Changes to and losses of habitat**

In general, the change and destruction of habitats are the primary drivers of biodiversity loss on a global scale. When ecosystems are destroyed, the animals that once lived there can no longer sustain themselves. As a result of the displacement or extinction of existing creatures in the ecosystem, biodiversity is lost (Ayoade et al., 2009; Agarwal et al., 2011). The rate at which ecosystems are being destroyed by humans has increased dramatically throughout the second part of the twentieth century. Humans frequently decimate natural environments in pursuit of industrial production, urbanization, and the extraction of natural resources. Some examples of habitat destruction and fragmentation include clearing forest areas for agriculture, transforming riverine habitats into lacustrine (reservoir) habitats through hydroelectric projects, mining, logging, urban sprawl, and highway construction (Agarwal et al., 2014), as well as mining and logging operations. An estimated 3.1% of the world's forest cover was lost between 2000 and 2005. Globally, 11,564,000 km<sup>2</sup> (or 2.4 percent) of forests were lost, with 272,000 km<sup>2</sup> going to the humid tropics, where timber extraction is the main cause. Because

of the high rates of endemism in tropical regions, these losses also constitute the extinction of species. Changes in land usage have occurred as a consequence of the increased avaricious demand for resources. As a result, biodiversity has been declining due to a combination of factors, including a decrease in genetic variety, a decrease in species richness, and an increase in ecological changes including disease outbreaks, habitat fragmentation, and random population shifts.

### **Pollution**

A major contributor to biodiversity loss in terrestrial, aquatic-marine, and freshwater ecosystems over the last half-century has been inorganic and organic contaminants. Another danger to biodiversity is thermal pollution. Organic contaminants in freshwater environments can lead to eutrophication, hypoxia in marine coastal ecosystems, air pollution in cities from nitrous oxide emissions, and global warming. The prevalence of such issues differs substantially across geographical areas. The overexploitation of agrochemicals like DDT, oil spills, acid precipitation, and other pollutants are wreaking havoc on habitats and the species that rely on them. Such as the falcon and fish-eating bird populations that have declined due to pesticide use. Many species, including cranes, swans, and ducks, die from lead poisoning after ingesting spent shotgun pellets that land in marshes and lakes. Vultures used to be commonplace in India's Gangetic plains, where they would often be observed nesting in the avenue trees of big cities. Even before the 1990s, they were considered a nuisance, especially to planes because of the frequency with which they were involved in bird strikes. In India, the vulture population has dropped by 99% (Prakash, 2007). This is mainly attributable to poisoning from pesticides like DDT and veterinary non-steroidal anti-inflammatory drugs like diclofenac. When vultures eat cattle, these drugs cause egg shells to thin, which in turn causes premature hatching and kidney failure in birds (Green et al., 2004; Muralidharan et al., 2008). Many nations in South Asia have launched initiatives to outlaw the use of diclofenac by veterinarians. There has been a sharp decline in the number of house sparrows in India in recent years. The pollution created by mobile phones' electromagnetic radiation is associated with it. The gradual reduction in nesting places due to changes in urban building design, the overuse of insecticides, and microwave towers (Balmori and Hallberg, 2007). Ms. Sheila Dikshit, who was chief minister of Delhi in 2012, designated the house sparrow as the state bird of Delhi in an effort to raise awareness and funds for the birds' conservation.

### **Alien species**

Either purposeful or unintentional, this can happen. When new species are introduced to an ecosystem, it will undergo transformations. Species that have been introduced to new environments do not originate from those places. Typically, people call these introduced species biological contaminants. Hybridization, out-competition, original ecosystem disruption, plant pathogenic affects, disease transfer, food chain disruption, and extinction are some of the ecological impacts of invasions. There are a variety of purposeful species introductions, including those involving agriculture, hunting, spotting, biotechnology, trade, and aesthetics.

### **Environmental shifts**

This becomes even more worrisome when atmospheric CO<sub>2</sub> levels rise, leading to a hotter planet. For the sake of ecological stability, nature has preserved a range of tolerance

as the majority of species begin within a very small physiological limit. Species go extinct when their top or lower limits are exceeded, regardless of how gradual the change is. Warmer temperatures in some areas and other recent climate change consequences have already been felt by ecosystems and species (Rawat and Semwal, 2014). They have altered the distributions of species, the sizes of populations, the time of migration and reproduction, and the frequency of disease and pest outbreaks. Numerous species restricted to certain areas may go extinct by the year 2050 as a result of predicted climate change. The effects of climate change might overtake all other factors in causing a general decline in biodiversity by the century's conclusion. In contrast to Europe's longer growing season, cereal crop productivity has declined in certain parts of Africa since 1970 due to a mix of local climate change and human influences. Ocean decadal oscillations have impacted fisheries along the west coast of North America, and large-scale climate fluctuations like "El Nino" have impacted fisheries off the coasts of Africa and South America. In most parts of the world, the negative effects on ecosystem services will exceed the positive ones as a result of the worsening climate change. According to the IPCC, global average surface temperatures will rise between 2.40 and 6.40 degrees Celsius above pre-industrial levels by the year 2100. As a result, biodiversity across the world is likely to suffer (Millennium Ecosystem Assessment, 2005).

### **Population**

There was a 2.5-billion-person growth in the global population between 1950 and 2011, and experts predict that number will rise to over 9 billion by the turn of the next century (Population Reference Bureau). Changes in biodiversity are inevitable consequences of the unquenchable demand for raw materials brought about by the ever-increasing human population. There is no one thing that affects biodiversity more than the human population. Dumont (2012) asserts that the global birth rate will have a significant impact on the extinction of pristine biodiversity up until the mid-century of this century. Consequently, limiting human population growth is critical for protecting natural habitats and species.

### **Preservation of Biodiversity**

The three primary goals of biodiversity conservation are:

- a) In order to protect the variety of species.
- b) Ecosystem and species sustainability in use.
- c) To preserve ecological processes that are vital to life and the systems that sustain it.

Protecting Earth's natural ecosystems and the myriad types of life within them is what biodiversity conservation is all about. All of the parts of biological variety must be preserved, maintained, used sustainably, recovered, and improved. Sustainable development guarantees the conservation of biodiversity by balancing the environment, society, and development. Environmental institutions, as well as rules and conventions for their enforcement and implementation, are necessary for this to happen.

### **Protecting Biodiversity: Why Is It Necessary?**

The general public tends to agree that places with a greater variety of plant and animal life tend to be more stable ecologically. Taking into account our level of reliance on the environment allows us to further assert the importance of biodiversity. For many of our needs, we rely directly on specific plant species. Similarly, there are many animal and

microbial species on which we rely, each for its own unique purpose. The extinction of once-thriving species is a direct result of human activities such as deforestation, habitat destruction, resource depletion, pollution, illness, hunting, and altered weather patterns. It is crucial to preserve biodiversity since it offers us several ethical and financial advantages and enhances our aesthetic experience. As we go more into the topic, the links between biodiversity and a sustainable future become increasingly apparent. Our very survival is dependent on protecting biodiversity.

**Methods for Preserving Biodiversity**

The variety of life on our planet is known as biodiversity. The following methods can be employed to preserve it:

**A. "Conservation in Place"**

One way to preserve biodiversity is by ensuring that species remain in their native environments. Protecting and preserving the natural ecosystem is the goal of this approach.

Several benefits are associated with in-situ conservation. Benefits of in-situ conservation include the following:

1. It is an easy and affordable way to keep biodiversity in check.
2. Many different kinds of life can be preserved all at once.
3. The creatures have a higher chance of evolving and adapting to new conditions because they are in a natural ecosystem.
4. National Parks, Wildlife Sanctuaries, and Biosphere Reserves are examples of protected areas that practice in-situ conservation.

**Part B: Conservation outside the Natural Environment**

One method of preserving biodiversity that does not take place in natural habitats is the practice of raising and caring for endangered species in controlled environments like zoos, nurseries, botanical gardens, gene banks, etc. Entities are not vying as fiercely for resources like food, water, and habitat. As we go more into the topic, the links between biodiversity and a sustainable future become increasingly apparent. Our very survival is dependent on protecting biodiversity.

There are several benefits to ex-situ conservation:

1. The animals are given more time and opportunities to breed.
2. It is possible to restore captive-bred creatures to their natural habitat.
3. Endangered species can be protected by the application of genetic methods.

**Global Initiatives to Preserve Biodiversity:**

The need to protect biodiversity is universal, affecting people everywhere. Everyone on the planet is worried about it. In 1972, during the United Nations Conference on Human Environment in Stockholm, the importance of preserving biological variety and making responsible use of its parts became widely recognized. The necessity to secure a legislative mandate for the preservation of global resources arose in 1973, when UNEP designated biodiversity conservation as a priority area. Concern for sustainable development on a global scale prompted the 1992 establishment of the Convention on Biological Diversity, which sought to establish a legally enforceable instrument to combat biodiversity loss and promote equitable distribution of its benefits (CBD, 2011).

The goals of the convention were:

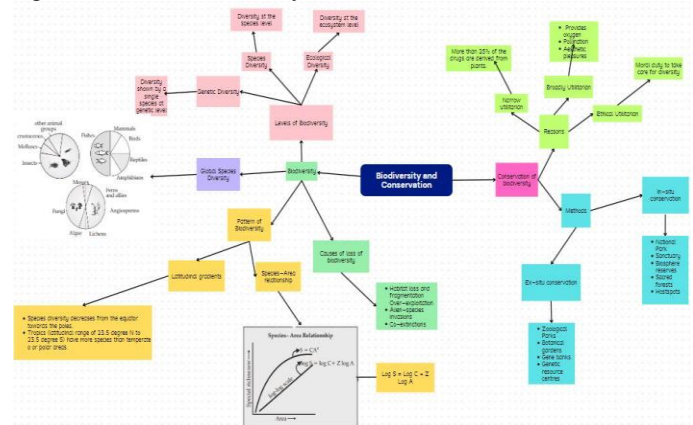
Preserving plant and animal species variety, Use of its parts in a sustainable way; Biodiversity and Community

Engagement, Both official and non-official groups are working on various projects to make this happen. One such ideology is Joint Forest Management, which encourages local people to work together to restore and preserve damaged forest areas near their homes. The trust and involvement of local communities are crucial for conservation measures to be successful (Dobhal et al., 2011).

**Methods for Preserving Biodiversity**

Key approaches to protecting biodiversity are as follows:

1. It is important to preserve all kinds of food, wood trees, cattle, microorganisms, and farm animals.
2. It is crucial to identify and protect any species that have a significant economic impact.
3. We must prioritize the preservation of unique ecosystems.
4. It is important to make good use of the resources.
5. There ought to be no hunting or poaching of wild animals.
6. Careful planning should go into the creation of the reserves and protected areas.
7. We need to lower the pollution levels in the ecosystem.
8. It is imperative that deforestation be outlawed.
9. Strict adherence to environmental rules is necessary.
10. It is important to protect both natural and man-made habitats for beneficial and endangered species of flora and fauna.
11. We need to raise people's consciousness about the significance of biodiversity conservation.



**Worldwide Assistance**

There are a number of international treaties and agreements that aim to increase global involvement and dedication to biodiversity conservation. One of them is the Rio-de-Janeiro Agreement, which was established during the Earth Summit by the United Nations Conference on Environment and Development (UNCED).

- a. The African Covenant on Environmental and Natural Resource Conservation.
- b. The International Convention on Wetlands (Ramsar Convention).
- c. World Conservation Union, an international organization.
- d. The Birds Convention, an international treaty.
- e. Plant Genetic Resources International Board.
- f. The World Minerals Fund.
- j. The WWF was that organization.
- h. The Convention on the Preservation of Wild Animals During Their Migration.
- i. The Convention on the International Regulation of Whaling.

## 1. The UNESCO Programme on Humans and the Biosphere.

The benefits to biodiversity have prompted the realignment of many development initiatives. For the sake of protecting ecosystems, especially those outside of our designated protected areas, this is of the utmost importance. For instance, every rural household in our nation is constitutionally obligated to have a green employment, according to the Mahatma Gandhi National Rural Employment Guarantee Scheme.

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