Plant Conservation and Biodiversity – An Overview

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The best friend on earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on the earth."

 *-*Frank Lloyd Wright

1. Abstract

 Human conservation efforts primarily concentrate on two strategies: Preserving the conditions, in which plants thrive[[2]](#footnote-2), and avoiding the death of the plants themselves. The goal of conservation is to protect future resources. However, economic opportunity frequently pushes humans to modify habitats and exploit plants species, often to the brink[[3]](#footnote-3) of extinction. At times, the nature of economics clashes with conservation. Because scarcity makes a resource more desirable to anyone who can still obtain it, incentives[[4]](#footnote-4) grow as supplies decline.

 Key words: Natural resources, Forest conservation, Concept of Biodiversity, Ecosystem services, Genetic Erosion

1. Introduction:

[Plants](https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants) are the fabric which covers the soil. They hold the soil in place to reduce erosion[[5]](#footnote-5) and improve water quality. Plants provide our food, materials for shelter, fuel to warm us and replenish the air we breathe. Plants provide food for [animals](https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/livestock) and habitat for [wildlife](https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/fishwildlife). The environment and its natural resources have to be conserved for our own needs and for future generations. Special efforts have to be made to reduce global warming. Planting of trees is being encouraged.

1. Sources of data:

 For secondary data Books, Journals and various websites have been referred

1. Concept of Biodiversity

The breadth of the concept reflects the inter- relatedness of genes, species are the components of ecosystems. Therefore, altering the makeup of any level of this hierarchy can change the others – species are the central to the concept of biodiversity.

 Since biodiversity covers a wide range of concepts and can be examined at different levels, therefore, it has now become customary to study of biodiversity at different hierarchical levels.

* Genetic diversity: Each species of living being store an immense amount of genetic information. The number of genes present in a species differs from those present in another species.

For instance, the number of genes is about 4000 in Escherichia coli[[6]](#footnote-6) (colon bacteria), 13000 in Drosophilia melanogaster[[7]](#footnote-7) (fruit fly), 32000 – 50000 in Oryza sativa (rice) and 35000 to 45000 in Homo sapiens (man).

A species with low genetic diversity results into uniformity. For example, large monocultures of genetically similar crop plants often lead to uniformity. The uniformity among crop plants is advantageous for achieving higher yield. However, it becomes a problem when an insect or a fungus attacks the field and poses threat to the entire crop. The genetic diversity within a species often increases with environmental variability. The evolution of new species i.e. Speciation[[8]](#footnote-8) depends upon the amount of genetic variation.

* Species diversity: Species diversity refers to the variety of species within a region. It includes the full range of species in the region, from microorganisms to multicellular plants and animals. Species are distinct units of diversity, each of which have specific role in an ecosystem. Therefore, loss of a species effect the ecosystem as a whole. The species diversity of a region is measured on the basis of two parameters: species richness and evenness/ equitability.
1. Importance and human dependence on biodiversity

To human race the biosphere is a life support system. Each species in this system has its own role its own importance. It is a combination of different kinds of living organisms which enables the biosphere to sustain the human race. Biodiversity is vital to biosphere’s health, stability and proper functioning.

Consumptive use: These are direct use values, where the biodiversity products are harvested and consumed directly. Examples: -Food, drugs, fuel etc.

Food: a large number of wild plants are consumed by human beings as food. Nearly 80- 90% of food crops have been domesticated only from the tropical wild plants.

Drugs: Around 70% of modern medicines are derived from plant and plant extracts.20, 000 plant species are believed to be used medicinally. For example, Germany alone uses more than 2,500 species of plants for medicinal purposes in homeopathy and other systems of medicines.

Fuel: Fire woods are directly consumed by villagers, tribal’s. The fossil fuels like coal, petroleum and natural gas are also the products of fossilized biodiversity.

Productive use: Biodiversity products have obtained a commercial value. These products are marketed and sold. These products may be derived from animals and plants.

1. Plant products

 Plant product Industry

 Wood Paper and pulp industry, railway, sleeper industry

 Cotton Textile industry

 Fruits, Vegetables Food industry

 Leather Leather industry

 Ivory Ivory- works

 Pearl Pearls industry

1. Ecosystem services

Biodiversity is essential to keep natural cycles and make the ecosystem self-sustaining unit. It is essential for the maintenance and sustainable utilization of goods and services from ecological systems as well as from individual species. Some of these services are

* Maintenance of gaseous composition of the atmosphere.
* Climate control by forests and oceanic systems.
* Natural pest control.
* Formation and protection of soil.
* Conservation and purification of water.
* Nutrient cycling.
1. Human interaction with biodiversity and the need for conservation
* Human have caused extinctions over a long time, not just in recent decades. The earliest humans probably caused extinctions through hunting with the invention of fire.
* Humans began to change habitats over large areas, with the development of agriculture and the rise of civilization, rapid deforestation and other habitat changes took place, as new areas were explored.

1. Genetic Erosion

 Genetic erosion occurs in plants for the following reasons:

* Loss of habitat is a cause of genetic erosion here as well.
* Overgrazing an area can lead to loss of plant species; so also the spoiling of an environment by land clearing or chemical dumping or over- zealous construction.
* Replacing local varieties of plants with those that wouldn’t occur there naturally, like plants from another area or genetically modified (GM) plants[[9]](#footnote-9), can also lead to genetic erosion.
* Modern agriculture is also responsible to a large extent for loss of genetic diversity. Farmers tend to grow a limited number of commercial crop varieties or GM crops, enforcing uniformity in farming, and so there has been a noticeable reduction in the many crop varieties that were seen with traditional farming.
1. Conservation Genetics:
* Russian workers have done pioneering work in the field of conservation of genetic resources of crop plants.
* It was V.I .Vavilov[[10]](#footnote-10), a geneticist and agronomist, who observed a number of highly resistant wheat varieties. Most of the plants can be preserved in their form of their seeds in small packets for long durations. Places where the seeds are stored are known as gene- banks or seed banks or sometimes germ plasma bank.
* Gene banks or seed banks earlier used simple techniques for preservation which involved storage of dried seeds under ambient or lower temperatures.
* Recent techniques of preservation have greatly extended the scope of germ plasma banks. Under liquid nitrogen which lowers temperature to about -1960C, seeds dried to low moisture content can be preserved for almost indefinite periods- several hundred years or so.
1. Why is biodiversity in crisis?

The escalating[[11]](#footnote-11) extinction crisis shows that the diversity of nature cannot support the current pressure that humanity is placing on the planet. Everyday species extinctions are continuing at up to 1,000 times or more the natural rate. The extinction of individual species, but also habitat destruction, land conversion for agriculture and development, climate change, pollution and the spread of invasive species are only some of the threats responsible for today’s crisis.

* Coral reefs[[12]](#footnote-12) provide food, storm protection, jobs, recreation and other income sources for more than 500 million people worldwide yet 70% of coral reefs are threatened or destroyed.
* 19,265 species out of the 59,507 so far assessed are threatened with extinction.
* Of the world’s 5,494 mammals, 78 are Extinct or Extinct in the Wild, with 191 Critically Endangered, 447 Endangered and 496 Vulnerable.

With the current biodiversity loss, we are witnessing the greatest extinction crisis since dinosaurs disappeared from our planet 65 million years ago. Not only are these extinctions irreversible, but they also pose a serious threat to our health and wellbeing.

1. Biodiversity and Climate change
* Biodiversity and climate change are very closely related issues. Biodiversity is strongly affected by climate change so we need to make additional efforts to minimize the negative influence of other factors, such as over – exploitation, habitat loss and fragmentation[[13]](#footnote-13), pollution, and the spread of invasive alien species. This way we can ensure that ecosystems are less Vulnerable and more resilient[[14]](#footnote-14) to the increasing threat posed by climate change.
* But climate change can also largely benefit from conserved biodiversity and particularly healthy ecosystems when these are placed at the very centre of the efforts to tackle climate change.
* Through absorbing and storing carbon in a range of terrestrial and marine ecosystems, such as forests, peat lands and other wetlands, biodiversity contributes to climate change mitigation by storing carbon dioxide.
* In recent years, the severe global climate change has altered the habitats of plenty of creatures. Therefore, some specific creatures are reduced dramatically every year, which causes great impacts on the ecology balance. As a result, the issue of biodiversity was added to the convention on important ecology protection in the Earth Summit1992, and the convention suggested that the nations should check and monitor the composition of the biodiversity positively and make plans for biodiversity protection and conservation. Thus, biodiversity conservation became essential and emphasized.
* Survey Data providing system: it is a platform for all the volunteers for example in Taiwan to upload the data of flora and fauna. The volunteers can use the standard survey data form on the web site to fill in the data and upload the photo to the database. If the surveyor has multiple records of survey data, they also can fill the data in Excel file or Txt file and upload the file to the back-end database. Therefore, surveyors do not need to repeatedly fill in the web site.
* Survey Data Sharing System: The system allows users to query the data in the database. With the subsystem, users can query the survey data of each species, view the photo of the species, and find statistic data of each species, for example the yearly surveyed number, the number of photos, the volume of uploaded data, etc. Thus, users can apply the system to query the data of each species, and also Endemic Species Research Institute can also understand the available data of the each species.
1. The IUCN categories of threatened species

The International Union for Conservation of Nature and Natural Resources (IUCN) has published the Red lists of threatened species. Few endangered plants are listed below:

 Pitcher plant, Indian belladonna, Orchids, Nilgiri Lily, Ginkgo biloba (Maiden hair tree). I would like quote two more plants here which are considered as endangered plants.

* The blue Neelakurinji flowers, which blooms once every 12 years seen at Mandalapatti hill in Kodagu district."
* Mappia foetida', a tree known for its anti-cancer properties.

 The main objectives of Red lists are:

* Identification and Documentation of endangered species.
* Providing a global index of the decline of biodiversity.
* Developing awareness about importance of threatened biodiversity , and
* Defining conservation priorities at local level and guiding conservation action.
1. Biodiversity Dynamics : Loss and Threats

Biodiversity dynamics is the analysis of dynamic models that arise from biological processes ranging from the level of individual organisms to that of populations, communities, and ecosystems.

Threats to Biodiversity: Extinction, the elimination of a species, is a normal process in nature. Species die out and are replaced by others, generally by their own descendants, as part of evolutionary change.

The rate of extinction, in undisturbed ecosystems, is estimated to be about one species per decade. In the last many decades, however, human impacts on populations and ecosystems have accelerated that rate, causing hundreds of species, subspecies and varieties to become extinct every year. And, if the present trends continue, millions of kinds of plants, animals and microbes may be destroyed in the next few decades. Causes of Extinction: The causes of extinction are population risk, environmental risk, and natural catastrophe.

1. Population Risk: Random variations in population rates (i.e. birth rates and death rates) can cause a species in low abundance to become extinct. It is a risk especially to species that consists of only a single population in one habitat.
2. Environmental Risk: Environmental risk means variation in the physical or biological environment, including variations in predator[[15]](#footnote-15), prey, symbiotic[[16]](#footnote-16) or competitor species. In case of species that are sufficiently rate and isolated, such normal environmental variations can lead to their extinction.
3. Natural Catastrophe[[17]](#footnote-17): A natural catastrophe is a sudden change in the environment (not as a result of human action).
4. Need for Reformation:
* As we are aware of the benefits we get from plants, we have to preserve them. We know that plants have a deep impact on the ecosystem. So if they are not conserved there will be an imbalance in the ecosystem, which will directly affect human beings. Humans are dependent on plants, so they need to be conserved.
* There should be protected areas for them like wild life sanctuaries, biosphere reserves and national parks in a country. Another way to protect the plants is to prohibit grazing, like activities that may cause the extinction of plants. Moreover, converting the cultivation area into construction area should be prohibited.
1. Conclusion:

Conservation of plants is very important for enriched biodiversity that helps in balancing the

ecosystem. Plants are the backbone of life on Earth and depend in the environment in many ways. It is our responsibility to conserve plants and save them from extinction. We should recover from all deforestation activities done by humans by planting trees. In order to achieve a more satisfactory relationship between society and its environment, timely provision should be made for the changes that human activities and competition over use of resources may bring about in order to minimize potential conflicts. It is important to conserve non-renewable resources, because if we use them too quickly there will not be enough. Most natural resources are limited. This means they will eventually run out. A perpetual resource has a never-ending supply.

 Be as useful as a tree! Give life to others; be shelter to everyone; grant fruits to all! Be good like a tree!

 Mehmet Murat ildan

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1. B.A.L,LL.B,LL.M ,Guest faculty of School of Law, University of Mysore [↑](#footnote-ref-1)
2. Thrive - To grow vigorously : flourish [↑](#footnote-ref-2)
3. Brink - The threshold of danger.

4Incentives - An incentive is something that encourages people to do something*.*

5Erosion - the process of the gradual wearing away of land masses.” [↑](#footnote-ref-3)
4. [↑](#footnote-ref-4)
5. [↑](#footnote-ref-5)
6. Escherichia coli - are bacteria found in the environment, foods, and intestines of people and animals. [↑](#footnote-ref-6)
7. Drosophilia melanogaster- Drosophila melanogaster, known colloquially as the fruit fly, remains one of the most commonly used model organisms for biomedical science. [↑](#footnote-ref-7)
8. Speciation - is how a new kind of plant or animal species is created. [↑](#footnote-ref-8)
9. Genetic modification of plants- involves adding a specific stretch of DNA into the plant's genome, giving it new or different characteristics. [↑](#footnote-ref-9)
10. Vavilov -  was a Russian and [Soviet](https://en.wikipedia.org/wiki/Soviet_Union) [agronomist](https://en.wikipedia.org/wiki/Agronomist), [botanist](https://en.wikipedia.org/wiki/Botanist) and [geneticist](https://en.wikipedia.org/wiki/Geneticist) who identified the [centers of origin](https://en.wikipedia.org/wiki/Vavilov_Center) of [cultivated](https://en.wikipedia.org/wiki/Horticulture) plants. [↑](#footnote-ref-10)
11. Escalating -increasing rapidly. [↑](#footnote-ref-11)
12. Coral reefs - a ridge of rock in the sea formed by the growth and deposit of coral. [↑](#footnote-ref-12)
13. Fragmentation - When an organism breaks down into several fragments is known as fragmentation.  [↑](#footnote-ref-13)
14. Resilient – able to withstand or recover quickly from difficult conditions. [↑](#footnote-ref-14)
15. Predator - It is an organism that primarily obtains food by the killing and consuming of other organisms [↑](#footnote-ref-15)
16. Symbiotic - a close, prolonged association between two or more different biological species. [↑](#footnote-ref-16)
17. Natural catastrophe - Violent, sudden and destructive change in the environment without cause from human activity, due to phenomena such as floods, earthquakes, fire and hurricanes. [↑](#footnote-ref-17)