Biodiversity: An Entrepreneurship Mission for the World to Conserve for Living Creatures in Future Prospects

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ARTICLE INFO

ABSTRACT

The term Biodiversity wasnamed by Walter Rosen, 1985. Approximately 50 million species of plants, animals & microbes are existing in the world. Among this only 2 million are identified so far. Biodiversity also includes: Variability of genus, Variability of varieties, Variability of species, Variability of populations in different ecosystems, Variability in relative abundance of species. Knowledge of biodiversity is essential for sustainable utilization of resources. Biological resources provide us: Nourishment, Clothing, House, Fuel, Medicine and Revenue. Biodiversity play a critical role in sustaining human populations across the globe. We depend on it for sustained food growth, for clean air and water and for medicine and shelter. It is no surprise then that ecosystem degradation threatens our most basic necessity – a healthy environment to live and thrive in. This is especially true of biodiversity hotspots, which house some of the largest diversity of species in the world and provide important life-support services to the people who live in and around them.

1. INTRODUCTION

"Biodiversity means species variation among living organisms from different sources including terrestrial, marine and desert ecosystems, and the ecological complexes of which they are a part. "Biodiversity is the variety of living species on Earth – plants, animals and microorganisms – and the ecosystems they form. An ecosystem is the name given to all living species that live together in a stable community, interacting with one another and their physical environment. Biodiversity includes the diversity within species and between different species within terrestrial, freshwater and marine ecosystems (Mohapatra 2006). The Classification of Biodiversity in India is shown in Figure 1.

However, depending upon the variability, The Biodiversity classification shown in Figure2. Ecosystems need a balanced and diverse number of species to thrive. When people think of conserving biodiversity, they often think of efforts to save animals such as the polar bear or the tiger. While protecting single species is important, it is equally important to protect ecosystems (Ray 2003, Khan 2001). When there is a shift in the balance of an ecosystem, such as the loss of a plant or an animal or an introduction of new species, this shift can lead to irreversible consequences. Therefore, it is important to understand what makes an ecosystem thrive.

2. SPECIES BIODIVERSITY

The Species biodiversity refers to the variety of different types of species found in a particular area. It is the biodiversity at the most basic level. It includes all the species ranging from plants to different microorganism. No two individuals of the same species are exactly similar. Biodiversity covers the full range of species on earth. Includes all the species, microbes, viruses, bacteria to animals and plants. Accordingly, the types of diversity are summarized as below:

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Classification of Biodiversity in India

Malayan Biodiversity:-

It is along the densely forested areas of the Eastern Himalayas and along the coastal areas.

Ethiopian Biodiversity:-

The arid and semi-arid regions of Rajasthan are characterized by this kind of biodiversity.

European Biodiversity:-This kind of biodiversity is found in the areas of upper Himalayas where the climatic characteristics are mostly temperate in

Indian Biodiversity:-

The dense forest areas of Indian plain are characterized by this kind of biodiversity.
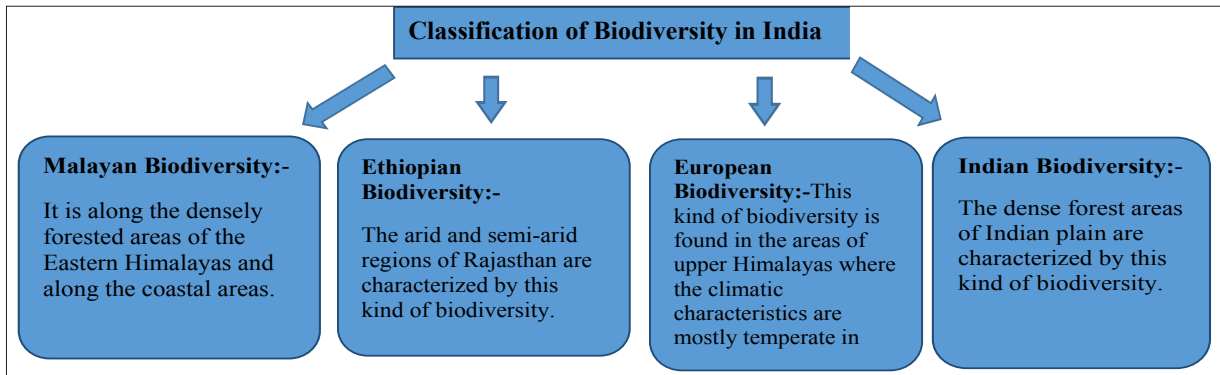
Figure 1. *Classification of Biodiversity in India*

Types of Biodiversity

Species Biodiversity   Genetic Biodiversity   Ecological Biodiversity
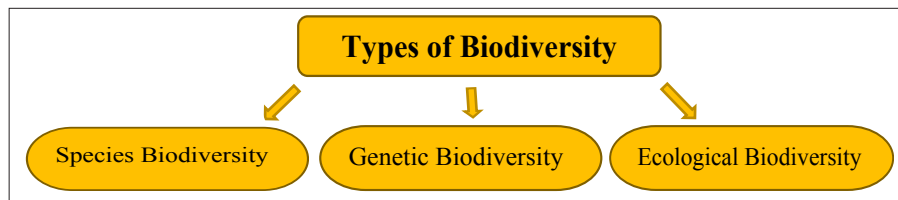
Figure 2. *Evaluate three types of Biodiversity*

3. GENETIC BIODIVERSITY

Generally, the genetic biodiversityrefers to the variations among the genetic resources of the organisms. Every individual of a particular species differs from each other in their genetic constitution. That is why every human looks different from each other. Similarly, there are different varieties in the same species of rice, wheat, maize, barley, etc. Genetic variation within species, both among individuals within single population and among geographically separated populations (Williams et al. 1991). It is the variation in genes within a species, i.e. between the individuals of species. It is this diversity in genes that allows species to adapt themselves in changing environments and adapt to diseases. *For example*: India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango etc.

4. ECOLOGICAL BIODIVERSITY

This type of biodiversity symbolizes the ecological background of species variation. An ecosystem is a collection of living and non-living organisms and their interaction with each other. Ecological biodiversity refers to the variations in the plant and animal species living together and connected by food chains and food webs. It is the diversity observed among the different ecosystems in a region. Diversity in different ecosystems like deserts, rainforests, mangroves, etc., includes ecological diversity. Biodiversity also includes variations in the geographical communities. This includes: Variations in the community in which the species lives, the ecosystem in which the community exists, Interaction within and between biotic and abiotic components. For example:grassland or a forest or a pond. They are all different ecosystems.

5. MEASUREMENT OF BIODIVERSITY

At simplest level: biodiversity is the species richness (Agarwal 1992). Various levels/parameters of measuring the biodiversity are:

(1). Alpha diversity

(2). Beta diversity

(3). Gamma diversity

5.1. Alpha Diversity

Alpha diversity refers to number of species in a single community at a particular time. Alpha diversity is better called as species richness. Alpha diversity is used to compare number of species in different communities.

Alpha Diversity of Site A = 7 species, Site B = 5 species, Site C = 7 species.

Community I   Community II

Alpha Diversity of Two Communities
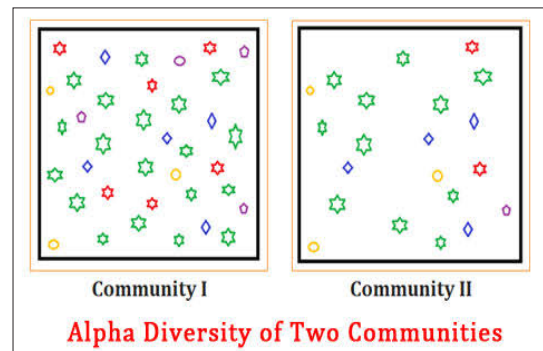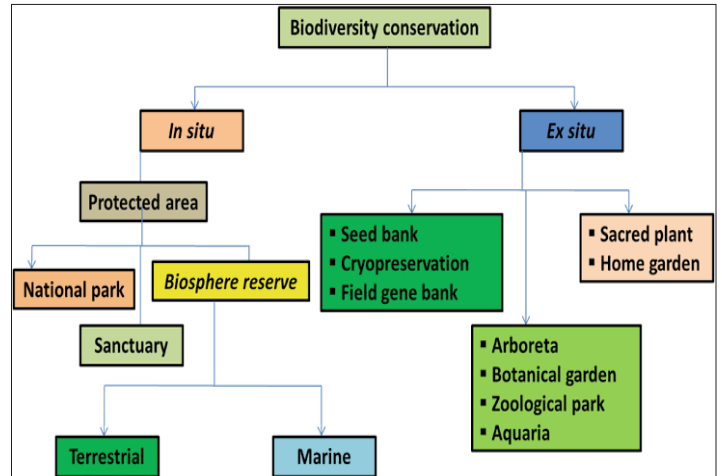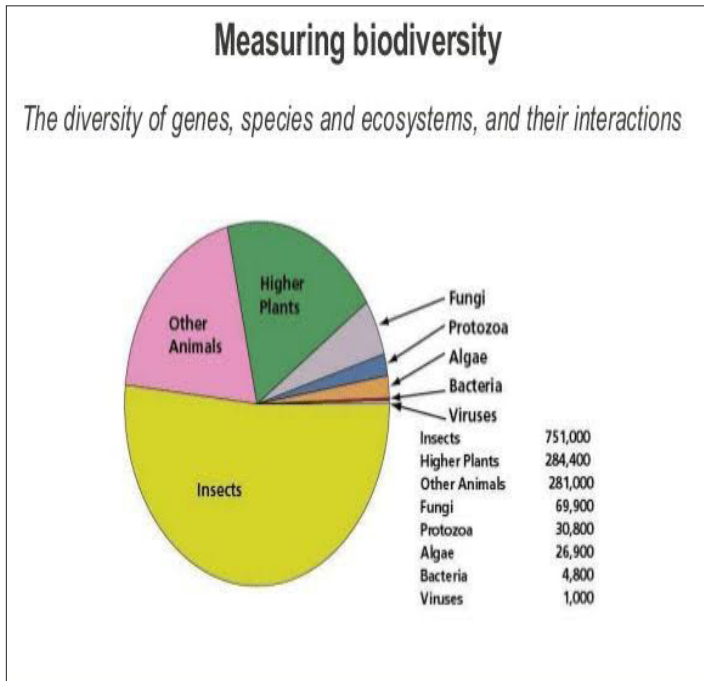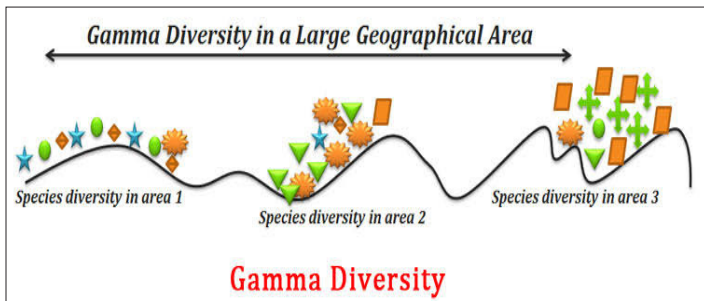
5.2. Beta Diversity

It is the measure of degree of change in species composition along with an environmental gradient. Example: Beta diversity is high, if the species composition of moss communities

changes successively at higher elevations on a mountain slope. Beta diversity is low if same species of moss occupy the whole mountain side.Beta Diversity is observed between Site A and C with 10 species that differ between them and only 2 species in common.

Beta Diversity of Two Habitats (Mountain Slopes)
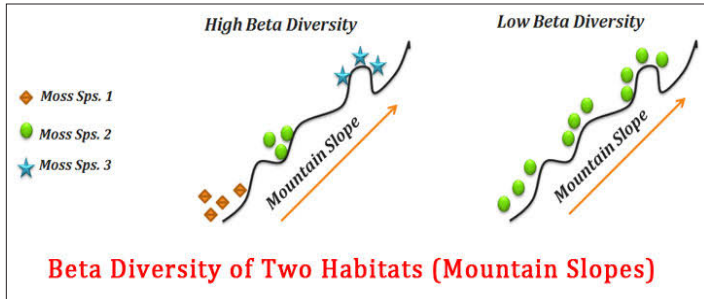
5.3 Gamma Diversity

Gamma diversity applies to large geographic scale. Gamma diversity is the rate at which additional species are encountered as geographical replacements within a habitat type in different localities. Gamma diversity is a species turnover rate with distance between sites of similar habitat or with expanding geographic areas".Gamma diversity of 3 habitats is 12 species as total diversity.

Gamma Diversity

Measuring biodiversity

The diversity of genes, species and ecosystems, and their interactions

Insects	751,000
Higher Plants	284,400
Other Animals	281,000
Fungi	69,900
Protozoa	30,800
Algae	26,900
Bacteria	4,800
Viruses	1,000

6. BIODIVERSITY CONSERVATION DEFINITION

"Biodiversity conservation refers to the protection, upliftment, and management of biodiversity in order to derive sustainable benefits for present and future generations."

Biodiversity conservation is the protection and management of biodiversity to obtain resources for sustainable development.

6.1 Biodiversity Conservation Has Three Main Objectives

a) To preserve the diversity of species.

b) Sustainable utilization of species and ecosystem.

c) To maintain life-supporting systems and essential ecological processes.

6.2. Biodiversity and its Conservation Methods

Biodiversity refers to the variability of life on earth. It can be conserved in the following ways:

6.3. In-situ Conservation

In-situ conservation of biodiversity is the conservation of species within their natural habitat. In this method, the natural ecosystem is maintained and protected. The in-situ conservation has several advantages.

Following are the important advantages of in-situ conservation: It is a cost-effective and convenient method of conserving biodiversity.A large number of living organisms can be conserved simultaneously (Delong 1996, Church *et al.* 1996). Since the organisms are in a natural ecosystem, they can evolve better and can easily adjust to different environmental conditions. Certain protected areas where in-situ conservation takes place include national parks, wildlife sanctuaries and biosphere reserves.

6.3.1. National Parks

These are small reserves maintained by the government. Its boundaries are well demarcated and human activities such as

grazing, forestry, habitat and cultivation are prohibited. For eg., Kanha National Park, Bandipur National Park.

6.3.2. Wildlife Sanctuaries

These are the regions where only wild animals are found. Human activities such as timber harvesting, cultivation, collection of woods and other forest products are allowed here as long as they do not interfere with the conservation project. Also, tourists visit these places for recreation.

6.3.3. Biosphere Reserves

Biosphere reserves are multi-purpose protected areas where the wildlife, traditional lifestyle of the inhabitants, and domesticated plants and animals are protected. Tourist and research activities are permitted here.

6.4. Ex-situ Conservation

Ex-situ conservation of biodiversity involves the breeding and maintenance of endangered species in artificial ecosystems such as zoos, nurseries, botanical gardens, gene banks, etc. There is less competition for food, water and space among the organisms.

Ex-situ conservationhas the following advantages:- The animals are provided with a longer time and breeding activity. The species bred in captivity can be reintroduced in the wild. Genetic techniques can be used for the preservation of endangered species.

6.5. Strategies for Biodiversity Conservation

Following are the important strategies for biodiversity conservation:

All the varieties of food, timber plants, livestock, microbes and agricultural animals should be conserved. All the economically important organisms should be identified and conserved. Unique ecosystems should be preserved first. The resources should be utilized efficiently. Poaching and hunting of wild animals should be prevented. The reserves and protected areas should be developed carefully. The levels of pollutants should be reduced in the environment. Deforestation should be strictly prohibited. Environmental laws should be followed strictly. The useful and endangered species of plants and animals should be conserved in their nature as well as artificial habitats.Public awareness should be created regarding biodiversity conservation and its importance.

6.5. Bio Geographic Regions and Provinces of India

There are 10 biogeographic regions or zones in India which are further divided into 25 biogeographic provinces. These are as follow

1. Trans Himalaya: This zone has three provinces Ladakh Jammu and Kashmir, Tibetan Plateau, Trans- Himalaya, Sikkim.

2. The Himalaya: It has four provinces-North-West Himalaya, West Himalaya, Central Himalaya and East Himalaya.

3. The Indian Desert: This zone includes two provinces- Thar and Kutch.

4. The Semi-Arid: This constitutes two namely-Punjab, Gujarat, Rajasthan.

5. The Western Ghats: Two provinces namely Malabar plains and Western Ghats Mountains are included in this zone.

6. The Deccan Plateau: This zone has five provinces Central Highlands, Chhota Nagpur, Eastern Highlands, Central Plateau and Deccan South.

7. The Coasts: Three provinces namely- West coast, East coast and Lakshadweep.

8. The Gangetic Plains: This zone has two provinces- Upper Gangetic plains and lower Gangetic plains.

9. North East India: Two provinces are included- Brahmaputra valley and North-East hills.

10. Islands: This zone include two provinces-Andaman and Nicobar. It is highly diverse set of biomes.

As we know that India is one of the mega diverse countries in the world, but many plants and animals are facing threats of extinction. The Wildlife Act mentions 253 fauna species as requiring adequate protection and 135 plants as species have been identified as endangered by the Botanical Survey of India.

6.6. Biodiversity Hotspots in India

India is known for its rich biodiversity and has 23.39% of the geographical area covered by forests and trees. Coined by Norman Myers, the term "Biodiversity hotspots" can be defined as the regions which are known for their high species richness and endemism (Myers 1990). According to Conservation International, a region must fulfil the following two criteria to qualify as a hotspot:The region should have at least 1500 species of vascular plants i.e., it should have a high degree of endemism.It should contain 70% of its original habitat.

a)   The Himalayas.

b)   Indo-Burma Region

c)   The Western Ghats

d)   Sundaland

6.6.1. The Himalayas

Considered as the highest in the world, the Himalayas comprises of North-East India, Bhutan, Central and Eastern parts of Nepal. This region holds a record of having 163 endangered species which includes the Wild Asian Water Buffalo, One-horned

Rhino and as many as 10,000 plant species, of which 3160 are endemic. This mountain range covers nearly 750,000 km2.

6.6.2. Indo – Burma Region

The Indo-Burma Region is stretched over a distance of 2,373,000 km^2. In the last 12 years, 6 large mammal species have been discovered in this region: the Large-antlered Muntjac, the Annamite Muntjac, the Grey-shanked Douc, the Annamite Striped Rabbit, the Leaf Deer and the Saola. This hotspot is also known for the endemic freshwater turtle species, most of which are threatened with extinction, due to over-harvesting and extensive habitat loss (Vane et al. 1996, Whittaker 1972, William et al. 1991). There are also 1,300 different bird species, including the threatened White-eared Night-heron, the Grey-crowned Crocias, and the Orange-necked Partridge.

6.6.3. The Western Ghats

The Western Ghats are present along the western edge of peninsular India and covers most of the deciduous forests and rain forests. This region consists of 6000 plant species of which 3000 are endemic. Originally, the vegetation in this region was spread over 190,000 km2 but has been now reduced to 43,000 km2(Mc Arthur etal.1967) The region is also known for 450 species of birds, 140 mammals, 260 reptiles and 175 amphibians.

6.6.4. Sundaland

The Sundaland hotspot lies in South-East Asia and covers Singapore, Thailand, Indonesia, Brunei and Malaysia. In the year 2013, the Sundaland was declared as a World Biosphere Reserve by the United Nations. This region is famous for its rich terrestrial and marine ecosystem. Sundaland is one of the biologically richest hotspots in the world which comprises of 25,000 species of vascular plants, of which 15,000 are found only in this region.

7. Endangered Species of India

India is known to be home for 6.5% of the world's species which includes 7.6% of all mammals and 12.6% of all bird species. But with the rapid loss of biodiversity, many species are becoming extinct or at risk of becoming critically endangered (Wilson 1961, Wilson 1992, Wilson 1988). The species that are at risk of extinction due to the sudden decrease in their population and habitat are known as endangered species.
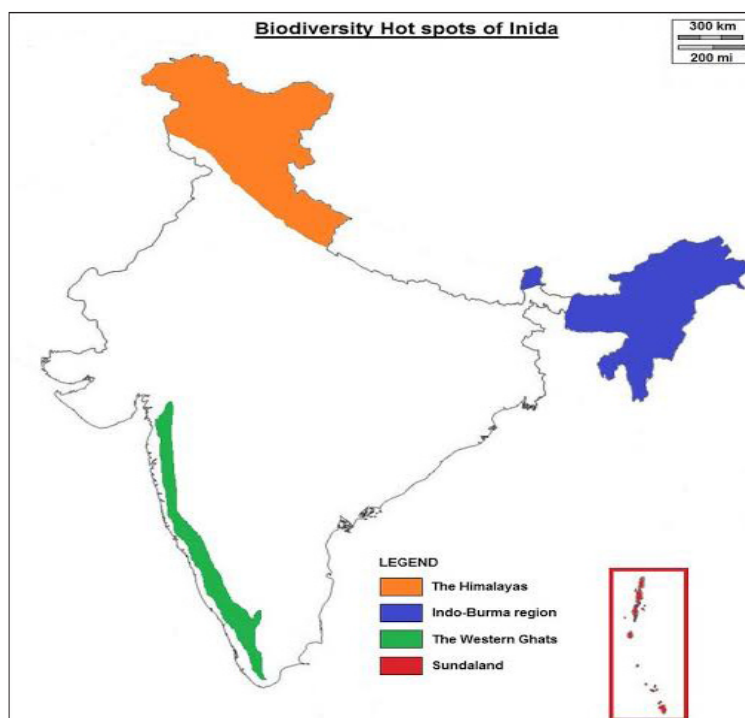
Top 5 endangered species (Flora and Fauna) in India are listed in the table below:

Top 5 Endangered Species of India

Endangered Animal Species	Endangered Plant Species
The Royal Bengal Tiger	Ebony tree
The Great Asiatic Lion	Indian Mallow
The Snow Leopard	Malabar Lily
The Pig Nosed Frog	Assam Catkin Yew
The Pink Headed Duck	Milkwort

7.1. Uses of Biodiversity

Biodiversity, besides its ecological significance, provides a socio-economic asset to the nation (Mc Neely et al. 1999, Hubbell 1997). Uses related to biodiversity can be grouped into three categories:

Biodiversity Hot spots of Inida

LEGEND
The Himalayas
Indo-Burma region
The Western Ghats
Sundaland

(1). Productive use

(2). Consumptive use

(3). Indirect use

7.1.1. Productive use

Products commercially harvested from biodiversity for exchange in market. Productive value of biodiversity is concerned with national income. Biodiversity provides: fuel, timber, fish, fodder, fruits, honey, cereals, medicinal plants etc. In India, income from biodiversity is nearly 30% (736.88 billion rupees, 1994-95)

7.1.2. Consumptive use

Consumptive uses of biodiversity deals with natural products that are consumed directly. They are goods which do not come under normal circulation of trade. Example: non timber forest products, Honey collected from forests, Medicine collected from forests

7.1.3. Indirect use

Indict use is the most significant us of biodiversity. This value is related primarily with functions of ecosystem. Biodiversity is very essential for: Ecological balance, Constancy of climatic features and Soil maintenance.

7.2 Economic Importance

a. Biodiversity is a reservoir of resources for the manufacture of food, cosmetic products and pharmaceuticals.

b. Crops livestock, fishery, and forests are a rich source of food.

c. Wild plants such as Cinchona and Foxglove plant are used for medicinal purposes.

d. Wood, fibers, perfumes, lubricants, rubber, resins, poison and cork are all derived from different plant species.

e. The national parks and sanctuaries are a source of tourism. They are a source of beauty and joy for many people.

8. Conclusion

Hence from above study it was concluded that bbiodiversity is our life. If the biodiversity got lost at this rate then in near future, the survival of human being will be threatened. So, it is our moral duty to conserve Biodiversity as well our Environment. Long term maintenance of species and their management requires co-operative efforts across entire landscapes. Biodiversity should be dealt with at scale of habitats or ecosystems rather than at species level. Thus, the presence of biodiversity on agricultural land is important for maintaining the whole biomass and ecological aspect to restore the health and productivity of farmlands.

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