AN OVERVIEW OF BIODIVERSITY & ITS CONSERVATION

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ABSTRACT

Diversity of nature, with its bountiful flora and fauna is a source of beauty, enjoyment, understanding and knowledge- a foundation for human creativity and subject for study. Study of animal life is a fascinating subject to say the least and a challenge at best. India is very rich in biological diversity due to its unique biogeographic locations, diversified climatic conditions and enormous ecodiversity and geodiversity. India embraces three major biological realms, via, Indo-Malayan, Eurasian and Afro-tropical and is adorned with 10 biogeographic zone and 26 biotic provinces (Alfred, 1998). India possesses diversified ecosystem from snow clad high mountain ranges to sea coasts of all categories including desert and semi-arid regions, almost all types of forests, grass land, lakes and rivers, estuaries, lagoons, islands and ocean. The climate ranges from artic in the Himalayas to very hot in the thar desert of Rajasthan while annual rainfall varies from 100mm in the desert to 5000mm in the Cherrapunji hills. It is, therefore, quite inevitable that India having only 2 % of the World total landmass and harbours about 89,500 animal species comprising 7.28% of the world known animal species.

Thus, India is recognizing as one of the 17-mega diversity countries of the world with four biodiversity Hot Spots, of 34 such sites identified throughout the globe. In fact our countries is very rich in term of not only species diversity but is blessed with an enormous variety and variability (genetic diversity) with in species along with the presence of a large number of endemic species.

Key Words: Biodiversity, Fauna, India, Species

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INTRODUCTION

India has a rich and varied heritage of biodiversity, encompassing a wide spectrum of habitats from tropical rainforest to alpine vegetation and from temperate forests to coastal wetlands. India, one of the 17-megadiversity countries in the world, harbours a high level of biodiversity. This biodiversity is also unique: four of the 34 global hotspots of biodiversity, the western Ghats, the Himalayas, the north eastern India, south of Brahmaputra, along with Andaman Island and the Nicobar Island, part of the Sundaland hotspot are located within the country (Bawa, 2006). The term Biodiversity was coined by Walter G. Rosen in 1986, though its longer form 'Biological Diversity' was used earlier in 1980 by Thomas E. Lovejoy, a US conservation biologist. However, the credit of popularity of this word goes to E.O. Wilson, who is often called as 'Father of Biodiversity'.

Biodiversity is the totality of gene, species, and ecosystem in a region and thus it represent the total variability within all the living organisms and the ecological complexes they inhabit (Annapurna & Singh, 1999). The most acceptable definition of Biodiversity is the one held by the Convention of Biological Diversity (CBD), which was signed by more than 150 nations on June 5, 1992 at Rio-De-Janeiro. According to CBD biodiversity means the variability among living organisms from all sources, inter alias, terrestial, marine and other aquatic ecosystem and the ecological complexes of which they are part, this include diversity within species, between species and of ecosystem (Chaudhuri and Sarkar,2002). Biodiversity is a vast and undervalued resource. It comprises every form of life, from the tiniest microbe to the mightiest beast, and the ecosystems of which they are a part. It provides humanity with a cornucopia of goods and services, from food, energy and materials to the genes, which protect our crops and cure our diseases, thus biodiversity is "the library of life" (Khan, 2003)

BIOGEOGRAPHIC ZONE

India is the seventh largest country in the world and Asia's second largest nation with an area of 3,287,263 sq.km. encompassing a varied landscape rich in natural resources. Biogeographically, India is situated at the trijunction of three realms namely afro tropical, Indo-Malayan and Paleo-Arctic realms, and therefore, has characteristic elements from each of them. This assemblage of three distinct realms probably is a fact, which is believed to partly account for its rich and unique in biological diversity. Based on the available data, India ranks tenth in the world and fourth in

Asia in plant diversity, and ranks tenth in the number of endemic species of higher vertebrates in the world. The country has 10 different biogeographic zones and 26 biotic provinces.

BIODIVERSITY HOTSPOT

A biodiversity hotspot is a biogeographic region that is both a significant reservoir of biodiversity and is threatened with destruction. The biodiversity hotspots were originally identified by Dr. Norman Myers in two articles in The Environmentalist (1998 & 1990) and revised in an article in the journal Nature (2000). The term biodiversity hotspot specifically refers to 25 biologically rich areas around the world that have lost at least 70% of their original habitat. The remaining natural habitat in these biodiversity hotspots amounts to just 1.4 percent of the land surface of the planet, yet supports nearly 60 percent of the world's plant, bird, mammal, reptile, and amphibian species. February 2, 2005 : Conservationists named 9 new "Biodiversity Hotspots" In a recent press release, Conservation International updated the list with 9 new hotspots, although there has been no peer review of this revision and these new hotspots are still questioned by some.

STATUS OF FAUNAL DIVERSITY

Based on data currently available of different animal groups are presented in following table and compared with those known from the world.

Taxonomic Group	World species	Indian species	% in India
PROTISTA			
Protozoa	31250	2577	8.24
ANIMALIA			
Mesozoa	71	10	14.08
Porifera	4562	486	10.65
Cnidaria	9916	842	8.49
Ctenophora	100	12	12
Platyhelminthes	17500	1622	9.27
Nemertinea	600		
Rotifera	2500	330	13.2
Gastrotricha	3000	100	3.33

Kinorhyncha	100	10	10
Nematoda	30000	2850	9.5
Nematomorpha	250		
Acanthocephala	800	229	28.62
Sipuncula	145	35	24.14
Mollusca	66535	5070	7.62
Echiura	127	43	33.86
Annelida	12700	840	6.61
Onychophora	100	1	1
Arthropoda	987949	68389	6.9
Crustacea	35534	2934	8.26
Insecta	867391	59353	6.83
Arachnida	73440	5818	7.9
Pycnogonida	600	16	2.67
Pauropoda	360		
Chilopoda	3000	100	3.33
Diplopoda	7500	162	2.16
Symphyla	120	4	3.33
Merostomata	4	2	50
Phoronida	11	3	27.27
Bryozoa (Ectoprocta)	4000	200	5
Endoprocta	60	10	16.66
Brachiopoda	300	3	1
Pogonophora	80		
Praipulida	8		
Pentastomida	70		
Chaetognatha	111	30	27.02
Tardigrada	514	30	5.83
Echinodermata	6223	765	12.29
Hemichordata	120	12	10

Chordata	48451	4952	10.22
Protochordata (Cephalochordata+Urochordata)	2106	119	5.65
Pisces	21723	2546	11.72
Amphibia	5150	209	4.06
Reptilia	5817	456	7.84
Aves	9026	1232	13.66
Mammalia	4629	390	8.42
Total (Animalia)	1196903	868741	7.25
GrandTotal (Protista + Animalia)	1228153	871318	7.28

Source: Faunal Diversity in India, ZSI

THREATEN FAUNAL DIVERSITY

Biodiversity is under threat worldwide. India has a total of 89,451 animal species accounting for 7.28% of the faunal species in the world (MoEF 1997) . According to the Red List of Threatened Animals (IUCN. 2000), amongst animals, 18 are critically endangered, 54 endangered and 143 are vulnerable. Ten species are Lower Risk conservation dependent, while 99 are Lower Risk near threatened. India ranks second in terms of the number of threatened mammals, while India is sixth in terms of countries with the most threatened birds. Threats to species are principally due to a decline in the areas of their habitats, fragmentation of habitats and decline in habitat quality and in the case of some mammals hunting (Kumar *et. al*., 2000)

Taxon	Total Indian Species	Endemic Species	Percentage
Protozoa			
Freeliving	1247	90	7.21
Parasitic	1330	550	41.33
Mesozoa	10	10	100.00
Porifera			

Freshwater	31	13	41.93
Cnidaria	842	10*	
Platyhelminthes	1622	1160	71.88
Rotifera	330	23	7.00
Gastrotricha	100	64	64.00
Kinorhyncha	10	7	70.00
Nematoda	2850	400*	
Acanthocephala	229	203	88.64
Mollusca			
Terrestrial	1487	498	33.50
Freshwater	183	77	41.80
Echiura	43	12	28.00
Annelida			
Oligochaeta	473	368	77.80
Hirudinea	59	25	42.37
Arthopoda			
Crustacea	2934	501	17.07
Insecta	59353	20717	34.90
Arachnida	5818	2623	45.08
Phoronida	11	1	1.00
Bryozoa	4000	12*	
Entoprocta	10	1	1.00
Chaetoghatha	111	3	2.70
Chordata			
Pisces	2546	223	8.75
Amphibia	209	128	61.24
Reptilia	456	214	47.00
Aves	1232	176	14.28
Mammalia	390	36	9.23

Source: Faunal Diversity in India, ZSI

* Completed data not available

IMPORTANCE OF BIODIVERSITY

Biodiversity is very important as it provides a number of valuable services to us. These are:

- Ecological Services: Biodiversity provides us various ecosystem services that sustain our life. Some of these services are as under:
  - Conservation and Protection of Water
  - Protection and Conservation of Soil
  - Climate Moderation
  - Maintenance of Ecosystem Integrity
- Biodiversity as a Source of Food
- Medicinal Value
- Wood and Non-timber Products
- Social Benefits

LOSS OF BIODIVERSITY

The precious wealth of biodiversity is at rik as a number of species of animal, plants or microbes are shrinking and becoming rare and threatened with extinction (complete loss of species from natural habitats). The extinction rate has substantially increased over the past few decades (currently 1,000 and 10,000 times greater than the natural one) as a result a number of valuable species are at risk of extinction. Looking at the grave situation of world biodiversity, IUCN (International Union for Conservation of Nature and Natural Resources) now known as The World Conservation Union prepared a list of species (plants or animals) showing various categories of extinction risk in 1988. These documents are known as Red Data Books or Red Data Lists. In these documents, IUCN has assessed status of world taxa threatened with extinction with a view to promote their conservation. The red data books on animals and plants threatened with extinction were first published in 1988. Since then, a number of species have been evaluated with this motive and given ranks as per their categories and criteria. It has prepared a publication entitled "*2004 IUCN Red List of Threatened Species*" that has complete information on threatened and endangered species of the world with risk of extinction. The species have been divided into various categories based on their taxonomy, distribution and conservation status. These categories are:

Extinct (EX)*:* A species is said to be extinct when none of its individual exists either in

wild or in cultivation or captivity.

Extinct in Wild (EW)*:* A species is assigned this category when it is known to survive only in cultivation, or in captivity or as a naturalized population well outside its natural range. None of its individual exists under natural condition.

Critically Endangered (CR)*:* When there is 80% reduction in the population of a given species over the last 10 years or three generations, whichever is longer, it is said to be critically endangered.

Endangered (EN): A species is said to be endangered when there is a reduction of about 70% in its population over the last 10 years or three generation, whichever is longer.

Vulnerable (VU): A species is known to be vulnerable when a reduction of 50% of its population is noticed over the last 10 years or the three generations, whichever is longer.

Besides, there are a few more categories identified by IUCN. These are:

Near Threatened **(NT):** Species that are neither CR, EN or VU but the reduction in its population is quite high and close to the above categories, it is said to be *near threatened*.

Least Concern **(LC)*:*** A species that is widespread and abundant (not categorized in either of the above categories)

Data Deficient **(DD):** Species for which available information is not complete but it is not under extinction risk.

Not evaluated **(NE):** Not yet evaluated species are placed in this category.

CAUSES OF BIODIVERSITY LOSS

Rapid biodiversity loss worldwide could be attributed to the following reasons:

- ✓ Habitat loss, deterioration and fragmentation
- ✓ Exotic species
- ✓ Overexploitation
- ✓ Environmental pollution
- ✓ Global warming
- ✓ Commercialization of agriculture and forestry

BIODIVERSITY CONSERVATIUON

Biodiversity is vital for our existence. Its depletion at a faster rate is a cause of concern for everyone. It is thus very important to conserve it and in this direction steps have been taken at the local, regional, national and even at the international levels. The conservation of biodiversity

can be *in-situ* (in which species are conserved within their natural range) or can be *ex-situ* (where the conservation is done outside the natural range of species).

***Ex-situ* Conservation**

Ex-situ conservation means "off-site" conservation. In this practice the species of plants and animals to be protected are removed from the natural habitats and are placed in the safer areas under the control of man. Botanical gardens, zoos and the arboreta are the traditional methods of ex-situ conservation. Here species of plants and animals are conserved by providing the congenial conditions. *Germplasm banks or Seed banks* (also *Gene banks*) are some other methods of ex-situ conservation.

***In-situ* Conservation**

I*n-situ* conservation means "on-site" conservation i.e. protection of species within the natural habitat of the species of animals and plants. It includes protection in the wildlife sanctuaries, national parks and biosphere reserves etc. that have been formed to protect threatened and even rare species. These methods help to conserve biodiversity without affecting their natural environment. All activities like hunting and poaching are prohibited in the protected areas.

In India we have 608 protected areas. These include:

· National Parks: 95

· Biosphere Reserves: 13

· Wildlife Sanctuaries: 500

Biosphere Reserves

These are the areas of terrestrial and coastal ecosystems that conserve biodiversity in a sustainable way. These are also known as living laboratories for demonstrating integrated management of land, water and biodiversity. The objectives of the biosphere reserves are to conserve biodiversity, to facilitate human and economic development and to provide logistic support to the people to undertake research and education activities and information exchange at international level. These are recognized internationally but are nominated by national Government and remain under sovereign jurisdiction of the country where they are located. The Biosphere Reserves are organized into three inter-related zones namely Core zone, Buffer zone and Transition zone. It is the core area which requires legal protection while some constructive activity may occur in buffer and

transition zone. At present, there are now 499 Biosphere reserves recognized in 110 countries world over. 10 In India, there are four internationally recognized Biosphere Reserves: *Nilgiri,* recognized in 2000, *Gulf of Mannar* in 2001, *Sunderbans* in 2001 and *Nanda Devi* in 2004 by MAB (Man and Biosphere Programme of UNESCO).

CONCLUSION

Biodiversity is the most significant national asset and constitutes enduring resources for supporting the continued existence of human societies. India is a mega diversity country. For this region alone, biodiversity conservation should be high on national agenda. The diversity of India biota has posed considerable challenges to generations of taxonomists in India and across the world. Of the estimated 5-50 million species of the world biota, only 1.7 million have been described to date.

Over the year man has advanced technologically but failed to understand and appreciate the value of biodiversity. Instead, our species has sustained exploitation of natural resources almost reach a stage of no return. Man being one of the chief components of biodiversity is dependent on resources around and also responsible for the present ecological imbalance of nature. This is a result of over exploitation of resources and unsystematic approach to the utilization of natural resources. Thus, biodiversity utilization and prudent management is the responsibility of the most highly evolved life form on earth, Man.

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