BIODIVERSITY AT GLOBAL, NATIONAL AND LOCAL LEVELS

- There are at present 1.8 million species known and documented by scientists in the world. However, scientists have estimated that the number of species of plants and animals on earth could vary from 1.5 to 20 billion! Thus the majority of species are yet to be discovered

- Most of the world's bio-rich nations are in the South, which are the developing nations. In contrast, the majority of the countries capable of exploiting biodiversity are Northern nations, in the economically developed world.

- These nations however have low levels of biodiversity

- Thus the developed world has come to support the concept that biodiversity must be considered to be a ‘global resource’.

- However, if biodiversity should form a ‘common property resource’ to be shared by all nations, there is no reason to exclude oil, or uranium, or even intellectual and technological expertise as global assets.

- India’s sovereignty over its biological diversity cannot be compromised without a revolutionary change in world thinking about sharing of all type of natural resources

- Countries with diversities higher than India are located in South America such as Brazil, and South East Asian countries such as Malaysia and Indonesia. The species found in these countries, however, are different from our own. This makes it imperative to preserve our own biodiversity as a major economic resource. While few of the other 'megadiversity nations' have developed the technology to exploit their species for biotechnology and genetic engineering
- Throughout the world, the value of biologically rich natural areas is now being increasingly appreciated as being of unimaginable value.
- International agreements such as the **World Heritage Convention** attempt to protect and support such areas

- India is a signatory to the convention and has included several protected Areas as World Heritage sites.

- These include Manas on the border between Bhutan and India, Kaziranga in Assam, Bharatpur in U.P., Nandadevi in the Himalayas, and the Sunderbans in the Ganges delta in West Bengal.

- India has also signed the Convention in the Trade of Endangered Species (CITES) which is intended to reduce the utilization of endangered plants and animals by controlling trade in their products and in the pet trade

INDIA AS A MEGA DIVERSITY NATION

- India's special geographical position between three distinctive centers of biological evolution and radiation of species is responsible for our rich and varied biodiversity

- Geological events in the landmass of India have provided conditions for high levels of biological diversity. A split in the single giant continent around 70 million years ago, led to the formation of northern and southern continents, with India a part of Gondwanaland - the southern landmass, together with Africa, Australia and the Antarctic.

- Later tectonic movements shifted India northward across the equator to join the Northern Eurasian continent.
- As the intervening shallow Tethis Sea closed down, plants and animals that had evolved both in Europe and in the Far East migrated into India before the Himalayas had formed.
- A final influx came from Africa with Ethiopian species, which, were adapted to the Savannas and semi-arid regions

- India is among the 17 countries identified as megadiverse countries.
- India constitute only 2.4% of the world's land but having 11% of flora and 6.5% of fauna of the world.
- India has 50,000 known species of insects, including 13,000 butterflies and moths. It is estimated that the number of unknown species could be several times higher.
- It is estimated that 18% of Indian plants are endemic

What is a biodiversity hotspot?

- A **biodiversity hotspot** is a bio geographic region with a significant reservoir of biodiversity that is under threat from humans.
- To qualify as a biodiversity hotspot on Myers 2000 edition of the hotspot-map, a region must meet two strict criteria: it must contain at least 0.5% or 1,500 species of vascular plants as endemics, and it has to have lost at least 70% of its primary vegetation.

- Four of 35 globally identified biodiversity hotspots are present in India

1. The Himalayas
2. The western ghats
3. The north east
4. Nicobar island

THREATS TO BIODIVERSITY

- The most obvious manifestation of biodiversity loss is the extinction of species.
- This is natural phenomenon but currently rate of extinction is more than the rate of speciation.

The main threat to biodiversity are;

1. Habitat loss and fragmentation
2. Introduction of invasive species
3. Overexploitation
4. Climate change and pollution
5. Poaching
6. Man and wildlife conflicts

ENDANGERED AND ENDEMIC SPECIES OF INDIA

- Of the well-known species, there are several which are endangered by human activity. The endangered species in the country are categorized as Vulnerable, Rare, Indeterminate and Threatened. Other species are found only in India and are thus endemic or restricted to our country. Some of these may have very localized distribution and are considered highly endemic
- Several plant and animal species in the country are now found in only one or a few Protected Areas

- Among the important endangered animals are charismatic species such as the tiger, the elephant, the rhino, etc.
- The less well-known major mammals restricted to a single area include the Indian wild ass, the Hangul or Kashmir stag, the Golden langur, the pygmy hog and a host of others.
- There are also endangered bird species such as the Siberian crane, the Great Indian Bustard, the Florican and several birds of prey.
- During the recent past, vultures which were common a decade ago, have suddenly disappeared and are now highly threatened. Equally threatened are several species of reptiles and amphibia. Many invertebrates are also threatened, including a large number of species that inhabit our coral reefs

- Many plant species are now increasingly threatened due to changes in their habitats induced by human activity. Apart from major trees, shrubs and climbers that are extremely habitat specific and thus endangered, there are thousands of small herbs which are greatly threatened by habitat loss. Several orchids are yet another group of plants that are under threat
- Many plants are threatened due to overharvesting as ingredients in medicinal products.
- To protect endangered species India has created the Wildlife Protection Act. This includes lists of plants and animals categorised according to the threat on their survival

CONSERVATION OF BIODIVERSITY

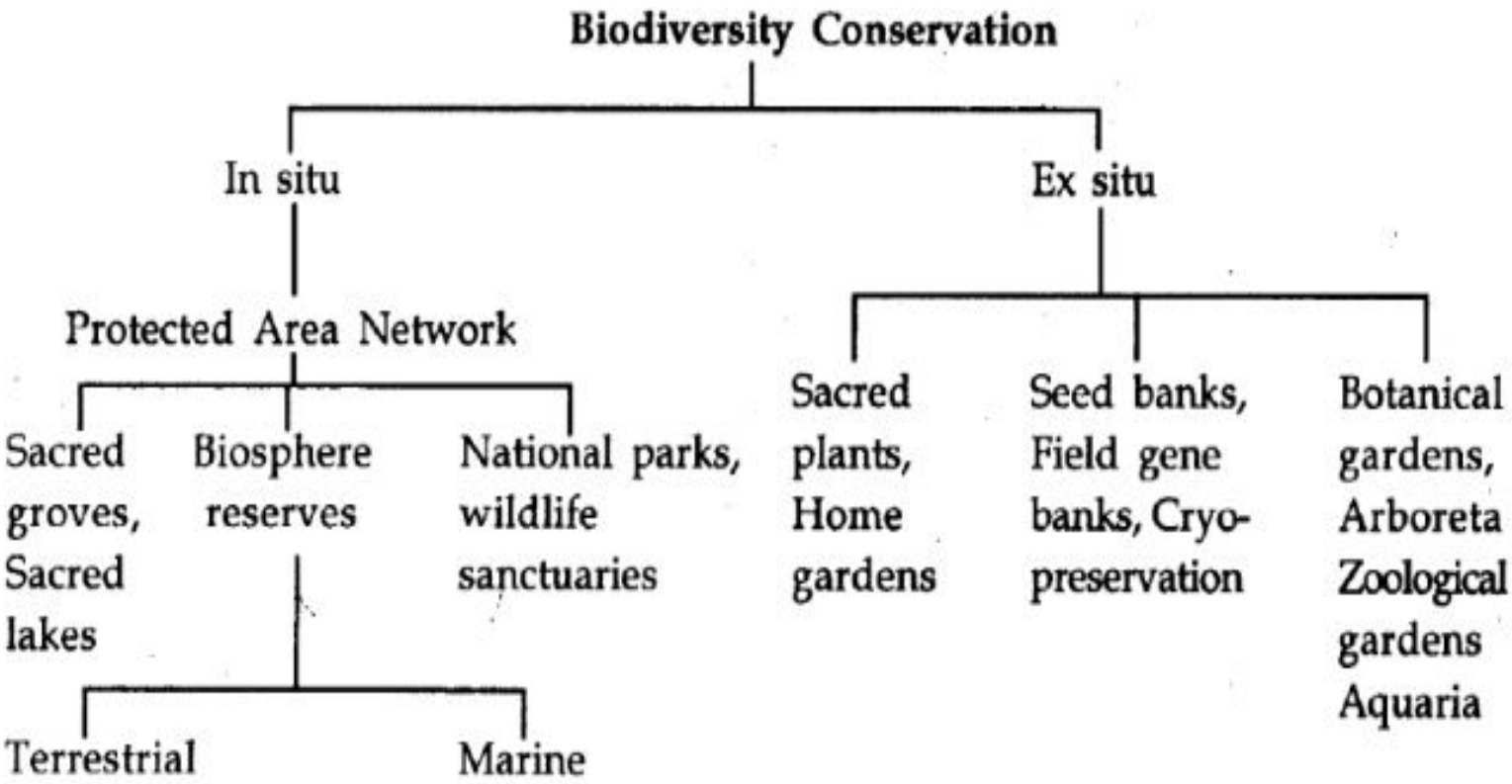

Fig. 1 The in-situ and ex-situ approaches of conserving biodiversity in India

BIODIVERSITY CONSERVATION

- **Biodiversity conservation** is about saving life on Earth in all its forms and keeping natural ecosystems functioning and healthy
- Conservation is of two kinds : In-situ conservation and Ex-situ conservation
- **In-situ** conservation, the conservation of species in their natural habitats, is considered the most appropriate way of conserving biodiversity.
- Conserving the areas where populations of species exist naturally is an underlying condition for the conservation of biodiversity. That's why protected areas form a central element of any national strategy to conserve biodiversity
- A **protected area** is a geographically defined area that is designated or regulated and managed to achieve specific conservation objectives. It may be set aside for the protection of biological diversity, and of natural and associated cultural resources and is managed through legal or other effective means.
- This includes national parks and nature reserves, sustainable use reserves (biospheres), wilderness areas and heritage sites

- National parks

National parks are protected areas, usually declared and owned by the central government. India first national park was established in 1936 as Hailey National park (now known as Jim Corrbett National park). At preset, there are 103 national parks in India.

- Wildlife sanctuary

Any area other than area comprise with any reserve forest or the territorial waters can be notify by state governments to constitute as a sanctuary if such area is of adequate ecological, faunal, floral, geomorphological, natural or zoological significance, for the purpose of protection.

- There are 543 wildlife sanctuary in India.

- Biosphere reserve

These are special category of protected areas of land or coastal environments, where people are an integral component of the system

These are representative examples of natural biomes and contain unique biological communities

The concept was launched in 1971 as a part of UNESCO's Man and Biosphere (MAB) progrmme

EX-SITU CONSERVATION

- **Ex-situ** conservation is the preservation of components of biological diversity outside their natural habitats. This involves conservation of genetic resources, as well as wild and cultivated or species, and draws on a diverse body of techniques and facilities. Some of these include:
- Gene banks, e.g. seed banks, sperm and ova banks, field banks;
- In vitro plant tissue and microbial culture collections;
- Captive breeding of animals and artificial propagation of plants, with possible reintroduction into the wild; and
- Collecting living organisms for zoos, aquaria, and botanic gardens for research and public awareness.
- Ex-situ conservation measures can be complementary to in-situ methods as they provide an "insurance policy" against extinction
- These measures also have a valuable role to play in recovery programmes for endangered species