GE 2211 Environmental Science and Engineering

Unit – II

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Threats to Biodiversity

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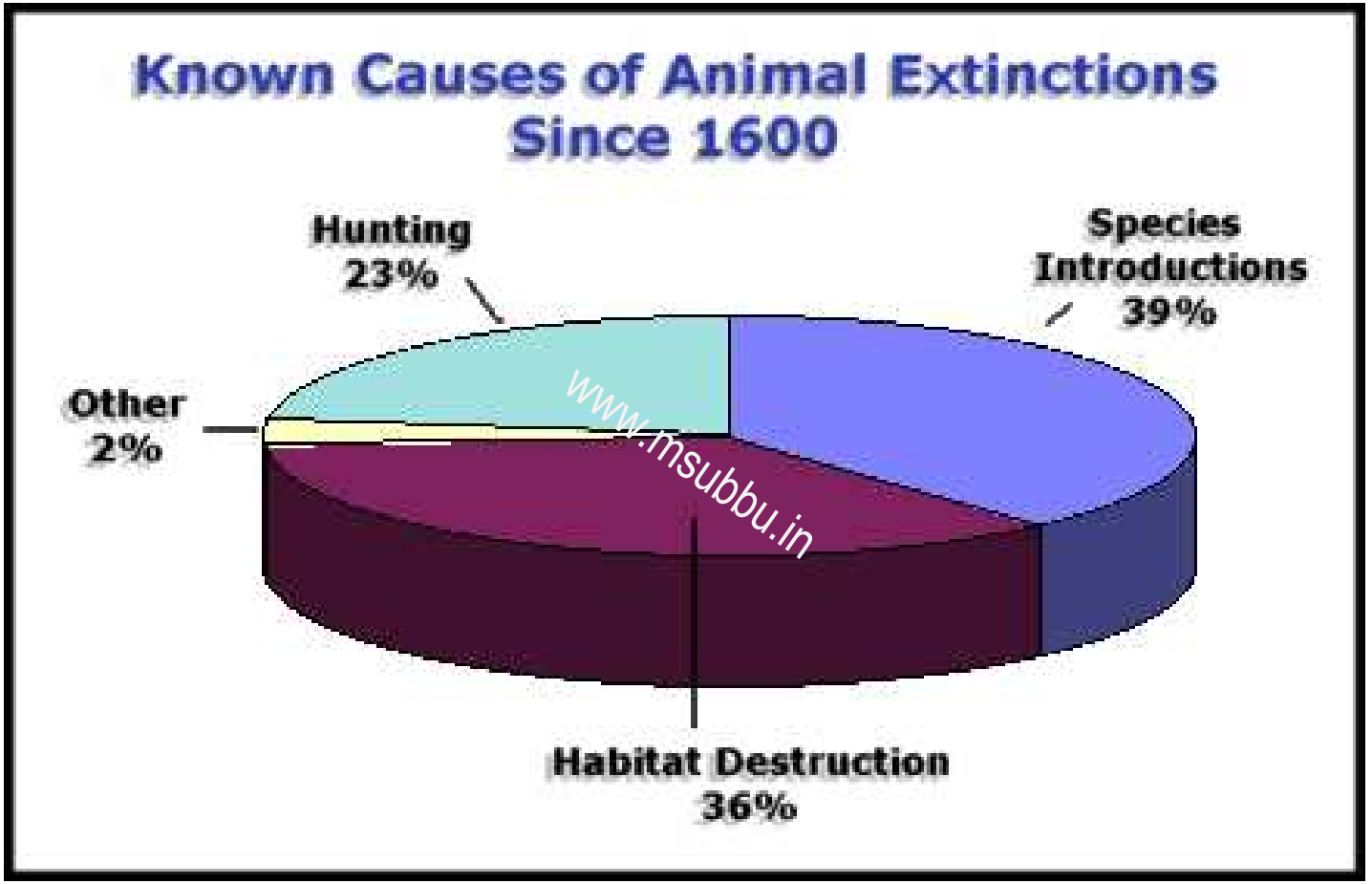
Growth of Human Population

- First, we can attribute the loss of species and ecosystems to the accelerating transformation of the earth by a growing human population.
  - As the human population passes the six billion mark, we have transformed, degraded or destroyed roughly half of the word's forests.
  - We appropriate roughly half of the world's net primary productivity for human use.
  - We appropriate most available fresh water, and we harvest virtually all of the available productivity of the oceans.

Human Actions

- Over-hunting
- Habitat loss/degradation/fragmentation
- Invasion of non-native species
- Pollution


Known Causes of Animal Extinctions Since 1600
Hunting 23%
Species Introductions 39%
Other 2%
Habitat Destruction 36%
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Over-Hunting

- Over-hunting has been a significant cause of the extinction of hundreds of species and the endangerment of many more, such as whales and many African large mammals.
- Most extinctions over past several hundred years are mainly due to over-harvesting for food, fashion, and profit.
- Commercial hunting, both legal and illegal (poaching), is the principal threat.
- The pet and decorative plant trade falls within this commercial hunting category, and includes a mix of legal and illegal activities. The annual trade is estimated to be at least $5 billion, with perhaps 1/4 to 1/3 of it illegal.

Habitat loss/degradation/fragmentation

- All species have specific food and habitat needs.
- The more specific these needs and localized the habitat, the greater the vulnerability of species to loss of habitat to agricultural land, livestock, roads and cities.

Invasion of non-native species

- If a plant occurs in a region where it is not indigenous, it is referred to as an **alien (exotic, foreign, introduced, non-native, non-indigenous)** plant.

- It is an important and often-overlooked cause of extinctions.

- Examples of non-native species in India
  - Eucalyptus tree
  - Seemai karuvel tree (Prosopis juliflora)

Eucalyptus Tree

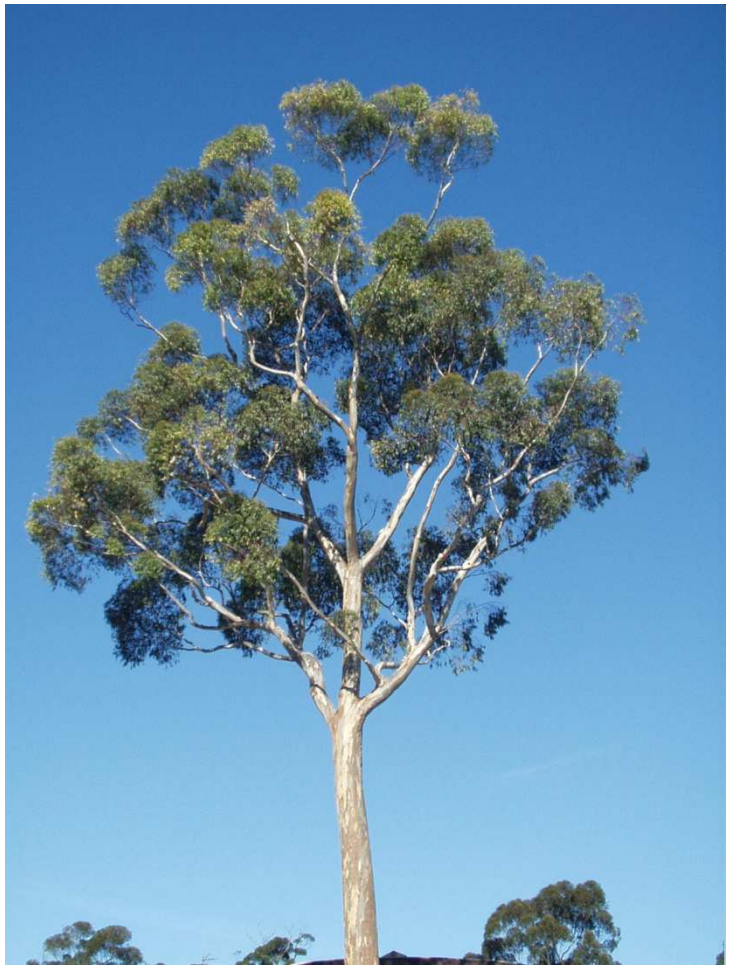
- Native to Australia
- Eucalypts draw a tremendous amount of water from the soil
- Eucalyptus forest tends to promote fire because of the volatile and highly combustible oils produced by the leaves, as well as the production of large amounts of litter which is high in phenolics, preventing its breakdown by fungi and thus accumulates as large amounts of dry, combustible fuel. Consequently, dense eucalypt plantings may be subject to catastrophic firestorms
- More often, it is used as raw material by the pulp and paper industry, which admires the tree's efficiency for economic reasons.

Eucalyptus in India

- Eucalypt has a long history in India. It was first planted around 1790 by Tippu Sultan, the ruler of Mysore, in his palace garden on Nandi hills near Bangalore, using seeds from Australia

- Subsequent to the planting at Nandi Hills, the next significant introduction of *Eucalyptus* was in the Nilgiri hills, Tamil Nadu, in 1843

- Most of the eucalypt plantations in India were raised during two decades between 1960 ~1980



Eucalyptus Tree

Prosopis juliflora

- Hindi – Vilayati babul; Telugu - Vilaiti Keekar; Tamil – Veli karuvai, Seemai karuvel

- A medium-sized, thorny tree or straggling bush with crooked main branches and a spreading, feathery canopy. First introduced from S America, by 1900 and has become the most common tree by edging out many native species. It is now a serious pest.

- It is native to Mexico, South America and the Caribbean. It has become established as a weed in Asia, Australia and elsewhere

- Prosopis was introduced in India during the 1870s to meet the fuel wood demand and in Tamil Nadu the 1960s, particularly in the composite Ramanathapuram and Tirunelveli districts.

Seemai Karuvel trees in Tuticorin District of Tamil Nadu

The Hindu (27/05/2009)

Prosopis juliflora (Seemai Karuvel) in Tuticorin district

Prosopis wood has been termed “wooden anthracite” because of its high heat content, burning slowly and evenly, while holding heat well and meeting as much as 75% of the rural fuel wood needs in arid and semi-arid India.

The Indian Forestry Department produces and markets Prosopis charcoal through special development corporations

A heap of semai karuvel wood for charcoal production (before covering with soil)

charcoal

Pollution

- Pollution from chemical contaminants certainly poses a further threat to species and ecosystems.

- While not commonly a cause of extinction, it likely can be for species whose range is extremely small, and threatened by contamination

Climate change

- A changing global climate threatens species and ecosystems.
- The distribution of species (biogeography) is largely determined by climate, as is the distribution of ecosystems and plant vegetation zones (biomes).
- Climate change may simply shift these distributions but, for a number of reasons, plants and animals may not be able to adjust.