

BIODIVERSITY

- **Biodiversity** is the variety and variability of life on Earth. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level.
- The **1992 United Nations Earth Summit** defined "**biological diversity**" as *"the variability among living organisms from all sources, including, 'inter alia', terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems"*. This definition is used in the United Nations Convention on Biological Diversity
- The term '**Biodiversity**', coined by **Walter G. Rosen** in the year **1985** which is a relatively compound word of the longer version '**Biological Diversity**', which was introduced by **Lovejoy (1980)** to express the number of species present in the community.

United Nations designated

- 2011–2020 -United Nations Decade on Biodiversity
- 2021–2030 -United Nations Decade on Ecosystem Restoration

4

DIFFERENT WAYS TO MEASURE BIODIVERSITY

1 SPECIES RICHNESS (ENTIRE REGION)

total number of species within the area



2 GENETIC DIVERSITY

total variety of genes within a single species



3 ENDEMIC SPECIES

species that occur here and nowhere else in the world

4

ECOSYSTEM DIVERSITY

total number of ecosystems in the region



Species



Unique ecosystem



Regional boundary

UNIQUE ECOSYSTEMS

ecosystems that occur here and nowhere else in the world (an aspect of ecosystem diversity)

Biodiversity value

CONSUMPTIVE

NON CONSUMPTIVE

LOCAL

- Food
- Fuel wood
- Medicine
- Crop varieties
- Fodder
- Timber
- Animal products
- Fish

COMMERCIAL

- Paper and pulp
- Fuel wood
- Medicine
- Crop varieties
- Fodder
- Timber
- Cotton
- Wool
- Silk
- Animal products
- Fish
- Resin
- Honey

ENVIRONMENTAL

- Balance of nature
- Biological productivity
- Regulation of climate
- Degradation of waste
- Cleaning of air and water
- Cycling of nutrients
- Control of potential pests and disease causing species
- Detoxification of soil and sediments
- Stabilization of land against erosion
- Carbon sequestration and global climate change
- Maintenance of soil fertility

SOCIAL

Part of their livelihood as well as through cultural and religious sentiments.

AESTHETIC

Knowledge and an appreciation of the presence of biodiversity for its own sake .
Ecotourism concept

ETHICAL

Related to biodiversity conservation are based on the belief that All forms of life have the right to exist on earth

ECOTOURISM

Ecotourism is defined as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education” (TIES, 2015).

Founded in 1990, The International Ecotourism Society (TIES) is a nonprofit organization dedicated to promoting ecotourism globally while providing guidelines and standards, technical assistance, training, research and publications.

Ecotourism has following principles:

- *Minimize physical, social, behavioral, and psychological impacts.*
- *Build environmental and cultural awareness and respect.*
- *Provide positive experiences for both visitors and hosts.*
- *Provide direct financial benefits for conservation.*
- *Generate financial benefits for both local people and private industry.*
- *Deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries’ political, environmental, and social climates.*
- *Design, construct and operate low-impact facilities.*
- *Recognize the rights and spiritual beliefs of the Indigenous People and work in partnership with them to create empowerment.*

According to the United Nations, there are three types: Hard ecotourist, Soft ecotourist and the Adventure ecotourist.

INDIA'S BIOGEOGRAPHIC ZONES

- 1. The cold mountainous snow covered Trans-Himalayan region of Ladakh.**
- 2. The Himalayan ranges and valleys of Kashmir, Himachal Pradesh, Uttarakhand, Assam and other North Eastern States.**
- 3. The Terai, the lowland where the Himalayan rivers flow into the plains.**
- 4. The Gangetic and Bhramaputra plains.**
- 5. The Thar Desert of Rajasthan.**
- 6. The semi arid grassland region of the Deccan plateau Gujarat, Maharashtra, Andhra Pradesh, Telangana, Karnataka and Tamil Nadu.**
- 7. The Northeast States of India,**
- 8. The Western Ghats in Maharashtra, Karnataka and Kerala.**
- 9. The Andaman and Nicobar Islands.**
- 10. The long western and eastern coastal belt with sandy beaches, forests and mangroves.**

GLOBAL 200

- The earth's biodiversity is distributed in specific **ecological regions**.
- There are over a thousand major ecoregions in the world. Of these, 200 are said to be the richest, rarest and most distinctive natural areas. These areas are referred to as the **Global 200**.
- WWF's Global 200 project analyzed global patterns of biodiversity to identify a set of the Earth's terrestrial, freshwater, and marine ecoregions that harbor exceptional biodiversity and are representative of its ecosystems. This process yielded 238 ecoregions--the Global 200--comprised of 142 terrestrial, 53 freshwater, and 43 marine priority ecoregions.
- Biodiversity features included species richness, endemic species, unusual higher taxa, unusual ecological or evolutionary phenomena, and the global rarity of habitats.

HOTSPOTS OF BIODIVERSITY

- A biodiversity hotspot is a biogeographic region with significantly high levels of biodiversity that is threatened by human activities. **Norman Myers** coined the term hotspots in **1988**.
- To qualify as a biodiversity hotspot, a region must meet two strict criteria:
 - i. It must have at least 1,500 vascular plants as endemics i.e. it must have a high percentage of plant life found nowhere else on the planet.
 - ii. It must have 30% or less of its original natural vegetation. In other words, it must be threatened.
- **36** areas around the world qualify as hotspots. They represent just 2.4% of Earth's land surface, but they support more than half of the world's plant species as endemics — i.e., species found no place else — and nearly 43% of bird, mammal, reptile and amphibian species as endemics.
- **Conservation International** was a pioneer in defining and promoting the concept of hotspots in **1989**.

India has **four** biodiversity hotspots:

i. Eastern Himalaya –encompasses eastern Nepal across Northeast India, Bhutan, the Tibet Autonomous Region to Yunnan in China and northern Myanmar.

ii. Indo-Burma region-encompasses eastern Bangladesh and then extends across north-eastern India, south of the Brahmaputra River, nearly all of Myanmar, part of southern and western Yunnan Province in China, all of the Lao People's Democratic Republic, Cambodia and Vietnam, the vast majority of Thailand and a small part of Peninsular Malaysia. In addition, the hotspot covers the coastal lowlands of southern China (in southern Guangxi and Guangdong), as well as several offshore islands, such as Hainan Island (of China) in the South China Sea and the Andaman Islands (of India) in the Andaman Sea.

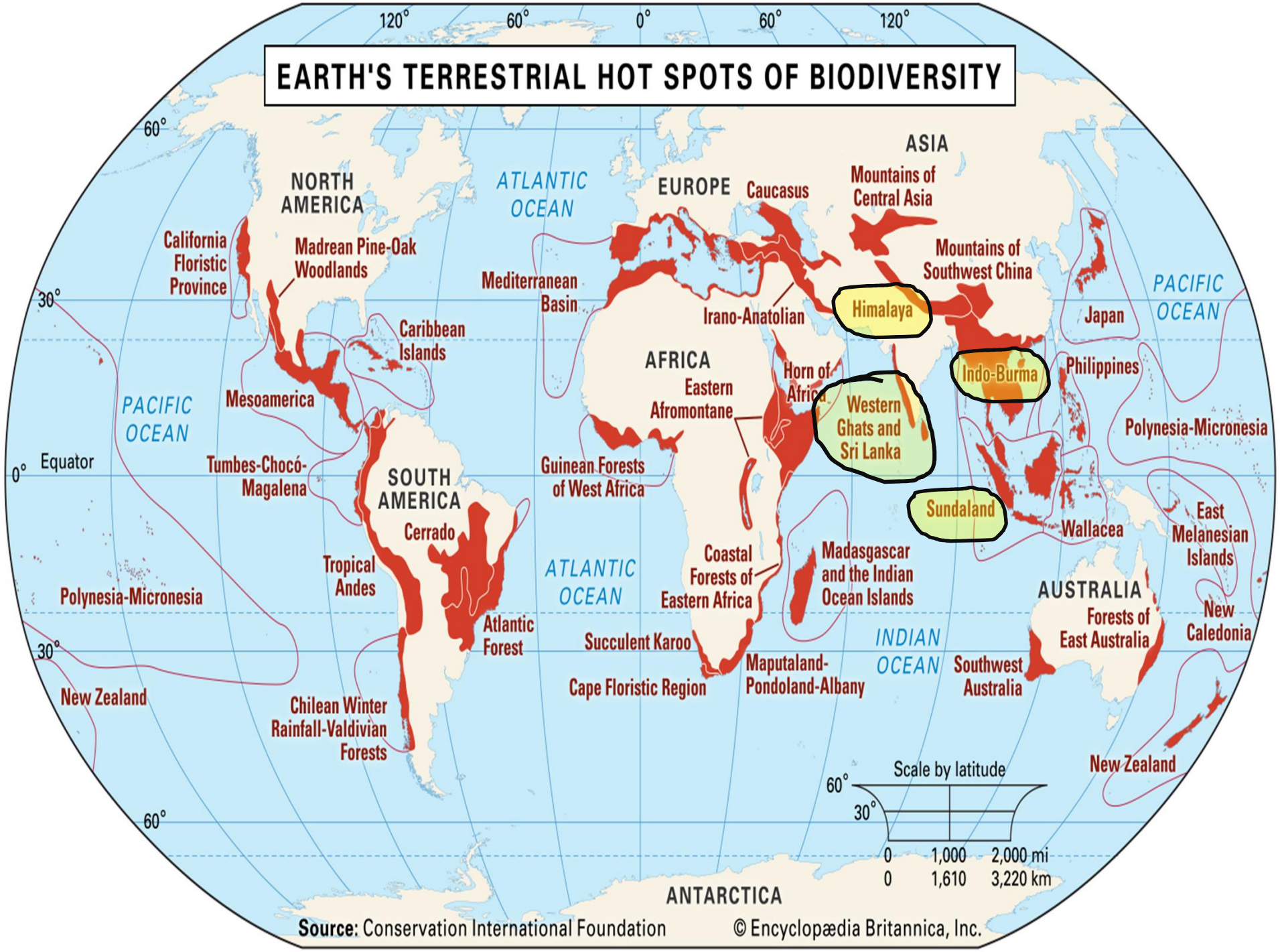
iii. Western Ghats and Sri Lanka -The Western Ghats, also known as Sahyadri (Benevolent Mountains), are a mountain range that extends parallel to the western coast of the Indian peninsula, traversing the states of Kerala, Tamil Nadu, Karnataka, Goa, Maharashtra and Gujarat. It is a **UNESCO World Heritage Site** and is **one of the eight "hottest hotspots" of biological diversity in the world.**

Wildlife of Sri Lanka has one of the highest rates of biological endemism (16% of the fauna and 23% of flowering plants are endemic in the world.

iv. Sundaland and Nicobar islands of India -Sundaland (also called the Sundaic region) is a biogeographical region of Southeastern Asia that includes the Malay Peninsula on the Asian mainland, as well as the large islands of Borneo, Java, and Sumatra and their surrounding small islands.

The Nicobar Islands are an archipelagic island chain in the eastern Indian Ocean located in Southeast Asia. **UNESCO has declared the Great Nicobar Island as one of the World Network of Biosphere Reserves.**

EARTH'S TERRESTRIAL HOT SPOTS OF BIODIVERSITY

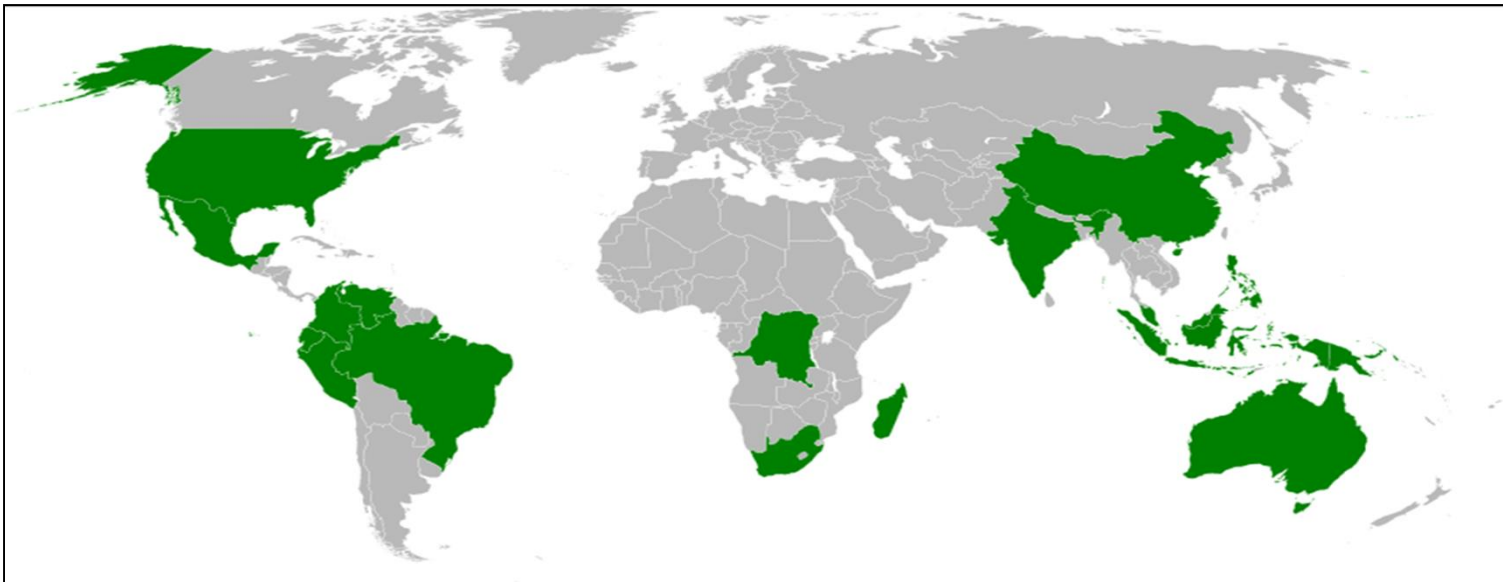


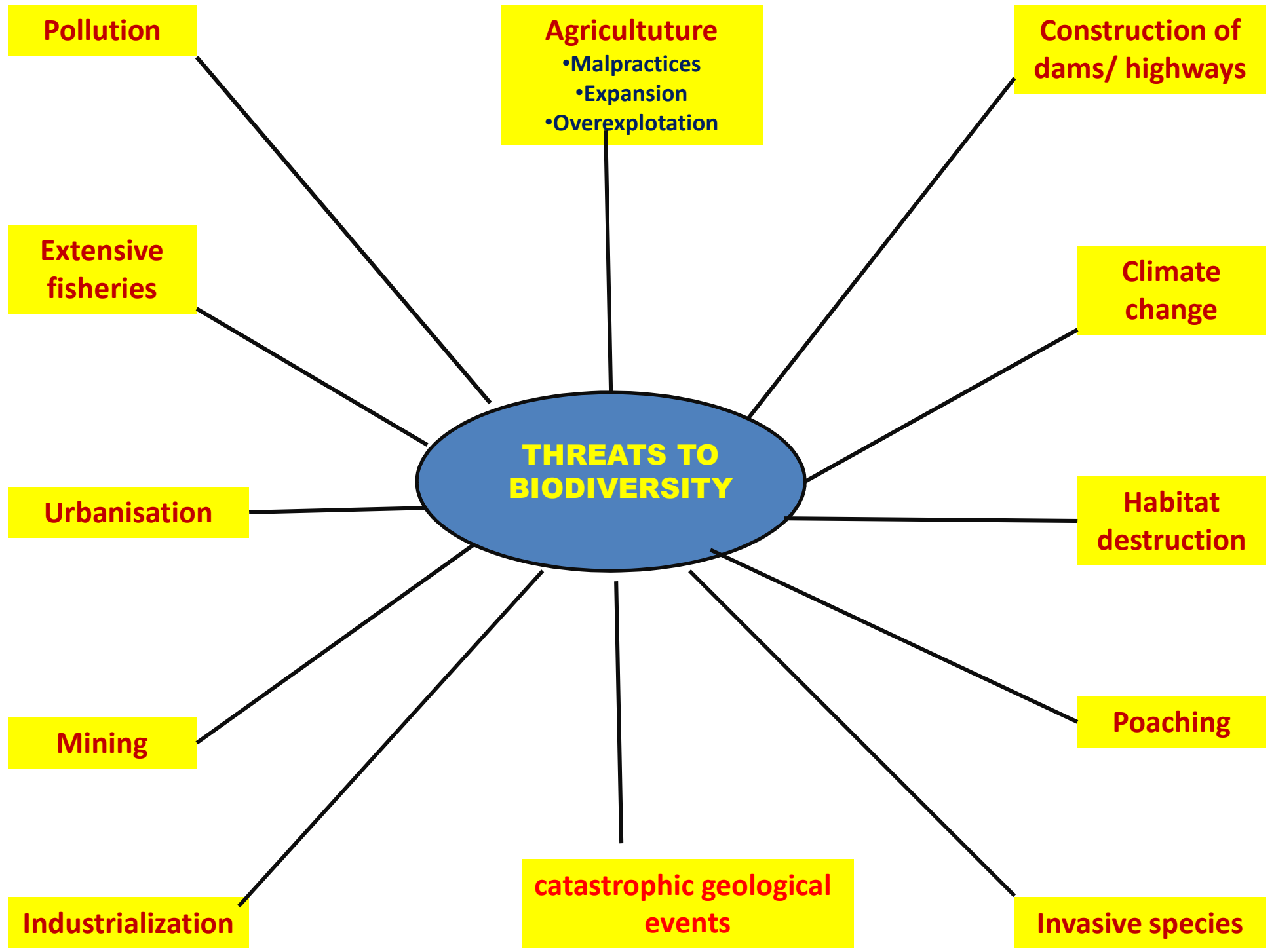
Source: Conservation International Foundation

© Encyclopædia Britannica, Inc.

MEGADIVERSITY NATION

- Megadiversity Nation is a term used to refer to the world's top biodiversity-rich countries with many species unique to a specific country. This concept was first proposed in 1988 by Conservation International.
- The principle criteria to qualify as a Megadiverse Nation is endemism, first at the species level and then at higher taxonomic levels such as genus and family. Also it must have:
 - a. At least 5000 of the world's plants as endemics
 - b. Marine ecosystems within its borders.
- 17 countries which have been identified as the most biodiversity-rich countries of the world, with a particular focus on endemic biodiversity.
- The identified Megadiverse Countries are: United States of America, Mexico, Colombia, Ecuador, Peru, Venezuela, Brazil, Democratic Republic of Congo, South Africa, Madagascar, India, Malaysia, Indonesia, Philippines, Papua New Guinea, China, and Australia.





PRIMARY DRIVERS

HABITAT LOSS

Thinning, fragmenting, or outright destruction of an ecosystem's plant, soil, hydrologic, and nutrient resources

INVASIVE SPECIES

Any nonnative species that significantly modifies or disrupts the ecosystems it colonizes

OVEREXPLOITATION

Process of harvesting too many aquatic or terrestrial animals, which depletes the stocks of some species while driving others to extinction

POLLUTION

Addition of any substance or any form of energy to the environment at a rate faster than it can be rendered harmless

CLIMATE CHANGE ASSOCIATED WITH GLOBAL WARMING

Modification of Earth's climate associated with rising levels of greenhouse gases in the atmosphere over the past one to two centuries

INFLUENCERS

- Human population growth
- Increasing consumption
- Reduced resource efficiency

BIODIVERSITY LOSS

Reduction in the number of genes, individual organisms, species, and ecosystems in a given area