



## Agricultural Expansion Threatens Biodiversity

**For Prelims:** [Biodiversity](#), [Chytridiomycosis](#), [Western Ghats](#), [Biodiversity Hotspot](#), [Wetlands](#), Nadukani-Moolamattom-Kulamavu Tribe, [Ecosystem](#), [Monoculture](#), [IUCN](#), [Precision Agriculture](#), [Intercropping](#).

**For Mains:** Agriculture as a threat to biodiversity, Sustaining biodiversity along with agriculture.

[Source: DTE](#)

### Why in News?

Recently, a study found that **agricultural expansion** is putting **frog populations at risk** in the **Western Ghats**.

- It is part of the **broader issue** of agricultural expansion **threatening biodiversity** and causing **habitat loss**.

### What are the Key Findings of the Study?

- **Impact of Agricultural Expansion:** Paddy fields and orchard expansion threaten frog population with paddy fields showing the **lowest frog diversity** and mango and cashew orchards housing the **fewest frogs overall**.
- **Decline of Rare Frog Species:** Rare species, such as the [CEPF Burrowing Frog \(Minervarya cepfi\)](#) and the [Goan Fejervarya \(Minervarya gomantaki\)](#), were **scarce** in altered agricultural habitats.
- **Global and Local Amphibian Decline:** About **40.7% (8,011 species)** of amphibians worldwide are classified as **threatened** due to habitat destruction, pollution, climate change and diseases like [chytridiomycosis](#).
  - The [Western Ghats](#), a [biodiversity hotspot](#) with 252 amphibian species (226 frogs), is facing **habitat loss** and declining frog populations.
- **Reasons for Decline:**
  - **Loss of Microhabitats:** Important microhabitats like **rock pools**, which protect **frog eggs and tadpoles** during dry spells, are being threatened by [agricultural practices](#).
  - **Wetland Destruction:** Agricultural and urban expansion is **destroying wetlands** crucial for frog reproduction.
  - **Agricultural Runoff:** Agricultural runoff with **pesticides and fertilizers** harms water quality, endangering sensitive frog populations.
  - **Climate Change:** Frogs' sensitivity to even minor environmental changes makes them **vulnerable to climate change** and human disturbances.

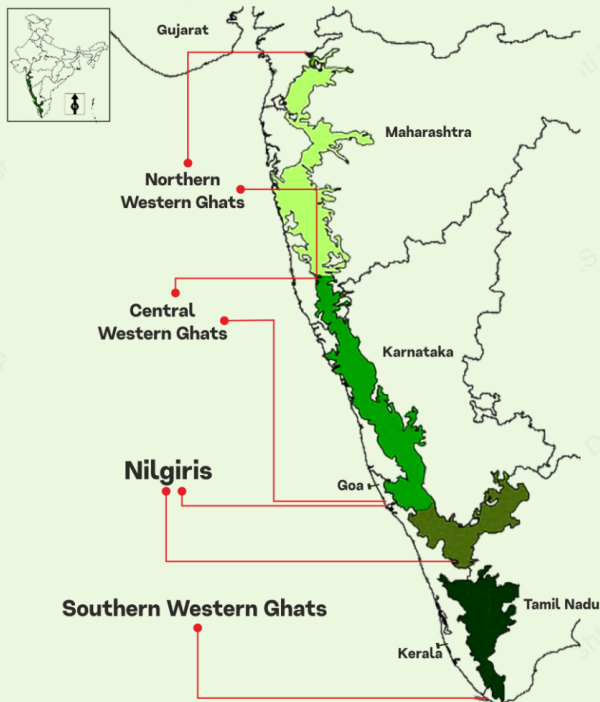
**Note:** Frogs hold **cultural importance** in Indian communities, symbolizing **rain and fertility**. E.g.,

- In **Assam**, **Bhekuli Biya** (frog marriage) is practised as a means of **invoking rain**.
- In **southern India**, frog marriage is known as **Mandooka Parinaya** for **invocation for rain**.

- In **Uttar Pradesh**, frog marriage is practised in places like **Sonebhadra, Gorakhpur, and Varanasi**.
- **Nadukani-Moolamattom-Kulamavu tribes** of **Kerala** harvest the **pig-nose purple frog** for food during the monsoon season.

# Western Ghats

One of the four biodiversity hotspots of India; recognised as a UNESCO WHS (2012)



## Rivers (originating)

- **West-flowing:** Periyar, Bharathappuzha, Netravati, Sharavathi, Mandovi
- **East-flowing:** Godavari, Krishna, Kaveri, Tunga, Bhadra, Bhima, Malaprabha, Ghataprabha, Hemavathi, Kabini

## Endemic Species

- Nilgiri tahr (IUCN Status - EN)
- Lion-tailed macaque (IUCN Status - EN)

## Imp Protected Areas

- **Biosphere Reserves** - Agasthyamala and Nilgiri
- **NP** - Silent Valley, Bandipur, Eravikulam, Wayanad-Mudumalai, Nagarhole
- **TR** - Kalakad-Mundanthurai, Periyar

## Imp Passes

- Thal Ghat Pass (Kasara Ghat)
- Bhor Ghat Pass
- Palakkad Gap (Pal Ghat)
- Amba Ghat Pass
- Naneghat Pass
- Amboli Ghat Pass

## Significance

- **Hydroelectricity** production
- Influences **Indian monsoon weather patterns**
- **Carbon sequestration** (neutralise ~4 MT of carbon every year)
- One of the 8 global **hottest hotspots** of biodiversity (due to richness in species and endemism)
- Rich in **iron, manganese and bauxite ores, timber, pepper, cardamom, oil palm and rubber**
- Sizeable indigenous population (including PVTGs)
- Important tourism/pilgrimage centres

## Major Threats

- Mining, Industrialisation
- Massive extraction of forest produce
- Human-wildlife conflict, encroachment, illegal hunting
- Livestock grazing, deforestation
- Large hydropower projects
- Climate change

## Imp Committees

- **Gadgil Committee (2011)** (Western Ghats Ecology Expert Panel)
  - » **Recommendation:** All of WG be declared as Ecological Sensitive Area (ESA) with only limited development allowed in graded zones.
- **Kasturirangan Committee (2013)**
  - » **Recommendation:** Instead of whole, only 37% of the total area of WG be brought under ESA + complete ban on mining, quarrying and sand mining be imposed in ESA.

## Names

- **Sahyadri** - northern Maharashtra; **Sahya Parvatham** - Kerala

## Diverted views about Mt. type

- **View 1:** Block Mt. formed due to down warping of a part of land into Arabian Sea
- **View 2:** Not true mt. rather the faulted edge of **Deccan Plateau**

## Major Rocks

- **Basalt, granite gneiss, khondalites, metamorphic gneisses, crystalline limestone, iron ore**

## Geographical Extent

- **Satpura** (in north) to the **end of TN at Kanyakumari** (in south)

## Mt. Ranges

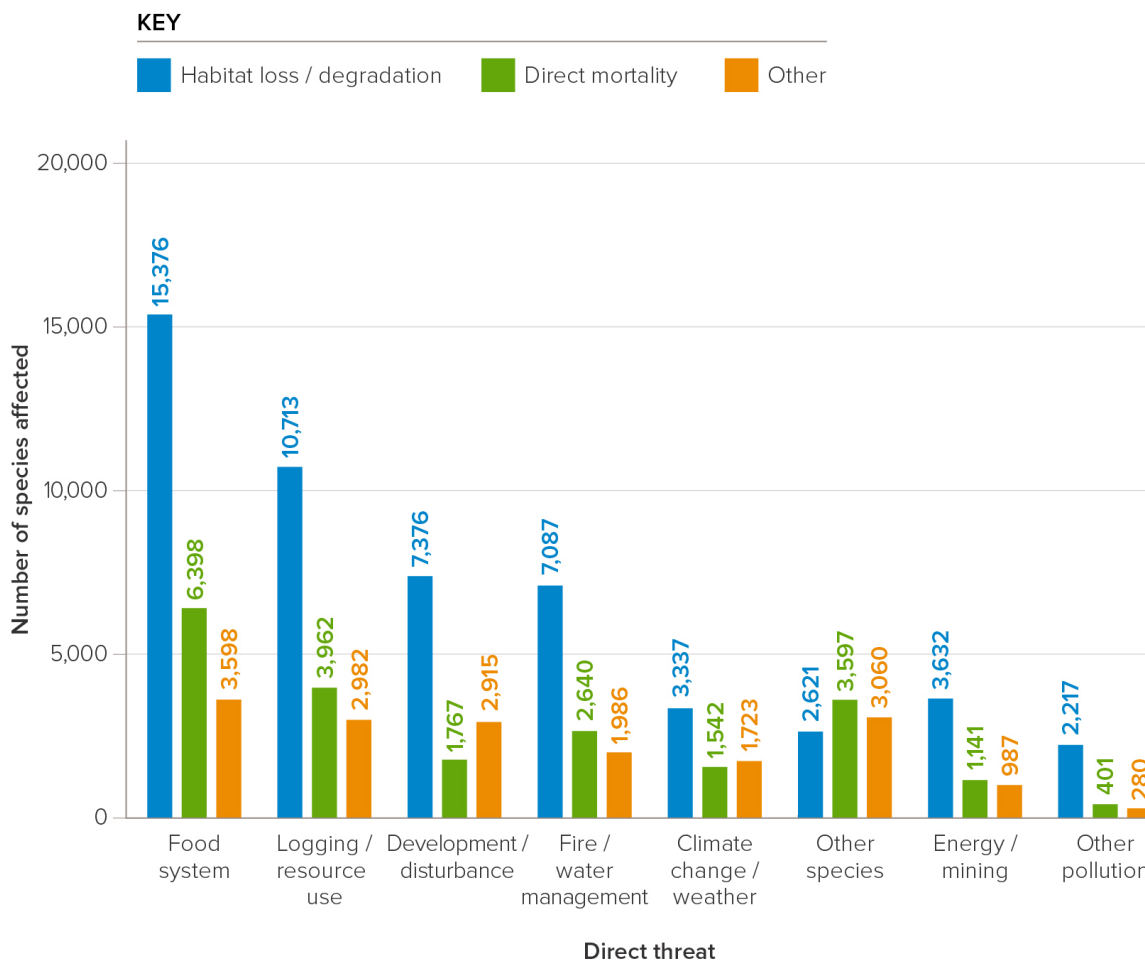
- Niligiri ranges, Shevaroy and Tirumala range
- **Highest peak - Anamudi** (Kerala)



## How Agricultural Expansion Threatens Biodiversity?

- **Deforestation:** Conversion of forests into farmland is the **leading cause of habitat decline**.
  - The area of primary forest worldwide has **decreased by over 80 million hectares since 1990** resulting in habitat destruction, **fragmentation**, and eventual extinction.

- **Habitat Destruction:** Between **1962 and 2017**, approximately **340 million hectares** of new cropland and **470 million hectares** of natural ecosystems were converted into pastures globally leading to the destruction of **critical ecosystems**.
- **Monoculture:** Large-scale agricultural practices like **cattle ranching, soy, and palm oil cultivation** replaces previously diverse ecosystems with **monocultures** and domesticated animals like **cows, goats, sheep, and pigs**.
- **Overuse of Chemicals:** Industrial agricultural practices, especially the overuse of **pesticides, fertilizers, and chemicals** pollute **groundwater** and **water systems**, affecting both aquatic and terrestrial species.
- **Reduced Carbon Storage:** Cropland stores significantly **less carbon** compared to the original forests or vegetation.
  - Land-use changes could release **17 gigatons of CO2 in the long-term**, worsening the climate crisis and threatening biodiversity by disrupting ecosystems.
- **Extinction Risks:** Around **13,382 species** of the **25,000 identified as threatened by the IUCN** are **endangered** primarily due to agricultural land clearing and degradation.
  - In addition, some **3,019 species** are affected by **hunting and fishing**, and **3,020 by pollution** from the food system.
- **Isolation of species:** Agricultural expansion **fragments habitats**, isolating ecosystems and increasing species' extinction risk due to **inbreeding, resource scarcity, and limited mobility**.



## How Agricultural Expansion and Biodiversity Protection Can Be Balanced?

- **Closing yield Gaps:** In many **low-income countries**, yields have **stagnated** despite growing food demand, leading to **increased land clearing**.
  - Closing the yield gap in **tropical countries with high biodiversity** is crucial to meet food demands without encroaching further on natural ecosystems.

- **Yield gap** is the difference between **current and potential yields**.
- **Sustainable Intensification:** **Precision agriculture** reduces pollution, emissions, and land use by optimizing fertilizer use, helping farmers **maintain high yields with fewer environmental costs**.
- **Diversified Farming Systems:** Practices like **intercropping** (growing multiple crops together) or using **cover crops** can **increase productivity** without additional chemical inputs, enhancing soil fertility and pest control.
- **Land-Use Planning:** Strong **land-use planning** and **zoning policies** that protect areas of **high ecological value** can direct agricultural growth while protecting sensitive ecosystems.
- **Healthier Diets:** Diets that are more **plant-based** and less reliant on resource-intensive **meat production** require less cropland and have a lower environmental impact. E.g., **seafood** is a healthier alternative to red meats.
- **Reducing Food Waste:** Reducing food loss and waste by half could **reduce global food demand by 15%**, and thus the need for **230 million hectares** of additional cropland.

## Conclusion

- **Agricultural expansion** poses significant threats to biodiversity, exemplified by the decline in frog populations in the Western Ghats. However, sustainable practices like **closing yield gaps, precision agriculture, diversified farming, and proper land-use planning** can help balance food production with biodiversity protection, ensuring both environmental and food security.

### **Drishti Mains Question:**

Q. How does agricultural expansion contribute to biodiversity loss, and what steps can be taken to mitigate this impact?

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### **Prelims**

**Q. With reference to the circumstances in Indian agriculture, the concept of “Conservation Agriculture” assumes significance. Which of the following fall under the Conservation Agriculture? (2018)**

1. Avoiding the monoculture practices
2. Adopting minimum tillage.
3. Avoiding the cultivation of plantation crops
4. Using crop residues to cover soil surface
5. Adopting spatial and temporal crop sequencing/crop rotations

**Select the correct answer using the code given below:**

- (a) 1, 3 and 4
- (b) 2, 3, 4 and 5
- (c) 2, 4 and 5
- (d) 1, 2, 3 and 5

**Ans: (c)**

**Q. Which of the following can be threats to the biodiversity of a geographical area? (2012)**

1. Global warming
2. Fragmentation of habitat

3. Invasion of alien species
4. Promotion of vegetarianism

**Select the correct answer using the codes given below:**

- (a) 1, 2 and 3 only
- (b) 2 and 3 only
- (c) 1 and 4 only
- (d) 1, 2, 3 and 4

**Ans: (a)**

**Mains**

**Q.** How does biodiversity vary in India? How is the Biological Diversity Act, 2002 helpful in the conservation of flora and fauna? (2018)

**Q.** The effective management of land and water resources will drastically reduce the human miseries. Explain. (2016)

PDF Reference URL: <https://www.drishtiias.com/printpdf/agricultural-expansion-threatens-biodiversity>

