

Invasive species and issues related to them in India and Andaman

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Manifest Pedagogy

Invasive species which are threatening the native forest species are often in news. The negative impact and their management could be an important dimension of preparation for mains. List of invasive species could be asked from a prelims perspective.

In news

Bullfrog tadpoles ate up all tadpoles of two endemic frogs in Andaman and Nicobar

Placing it in the syllabus

Environment- conservation

Static dimensions

- What are invasive species?
- List of invasive flora and fauna in India
- About Bull frogs

Current dimensions

- The negative impact of these species (How it affects biodiversity)
- The case of Andaman and Nicobar Bullfrog

Content

What are invasive species?

An **invasive species** can be any kind of living organism—an amphibian (like the cane toad), plant, insect, fish, fungus, bacteria, or even an organism's seeds or eggs—that is not native to an ecosystem and causes harm. They can harm the environment, the economy, or even human health. Species that grow and reproduce quickly, and spread aggressively, with potential to cause harm, are given the label “invasive.”

An **invasive alien species** is a species that is established outside of its natural past or present distribution, whose introduction and/or spread threaten biological diversity

The majority of invasive species are alien, but it is important to note that native species may also become invasive, usually under altered environmental conditions such as grazing, cyclones, changes in nutrient regimes, colonisation by an invasive species, or other alterations.

Modes of the transportation/pathways of Invasive species

A pathway is broadly defined as the means (e.g. aircraft, vessel or person), purpose or activity (e.g. farming, shipping or pet trade), or a commodity (e.g. fisheries) by which an invasive alien species may be transported to a new location, either intentionally or unintentionally.

Note that species can also expand their range through natural means. For example, birds can fly or be blown by storms to new locations. Some species or their propagules can be moved to new locations by wind, currents and in or on animals. This is referred to as natural dispersal and not an introduction. Natural dispersal may play a significant role in the subsequent spreading of an alien species once introduced to a new region or country.

List of invasive flora and fauna in India

| Name | State / Region | Native to | Affected area |
|-------------------------------|------------------------------|-----------------------------|---|
| African apple snail | Andaman and Nicobar | | It is now found across country and is threatening the habitat of several native species. |
| Papaya Mealy Bug | Assam | Mexico and Central America, | Destroyed huge crops of Papaya |
| Cotton Mealy Bug | Deccan | North America | Affected cotton crops |
| Amazon sailfin catfish | West Bengal | | Fish population in the wetlands of Kolkata. |
| Black Wattle | Western Ghats | South East Australia | It is distributed in forests and grazing lands in high altitude areas |
| Water Hyacinth | It is found throughout India | Tropical America | Aggressive colonizer. Abundant in still or slow floating waters. A nuisance for an aquatic ecosystem. |
| Black Mimosa | Himalaya, Western Ghats | Tropical North America | Aggressive colonizer. It invades watercourses and seasonally flooded wetlands. |

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|---|--|---|--|
| Parthenium/ Congress grass, Parthenium | It is found throughout India | Tropical North America | Aggressive colonizer. A common weed of cultivated fields, forests, overgrazed pastures, wastelands, and gardens. |
| Cannibal Snail / Rosy wolf snail | – | Native to the southeastern United States. | Indian Ocean |
| Indian Bullfrog | Andaman and Nicobar | Afghanistan, Bangladesh, India, Myanmar, Nepal, Pakistan | Threat to marine species, especial small endemic vertebrates |
| Lantana camara | In the Bandipur National Park, Karnataka | South America | It hinders the growth of native vegetation that herbivores such as deer and elephants feed on. Further, its fruit is toxic to animals |

About Bullfrogs

The bullfrogs are prolific breeders: they have short breeding seasons, and each egg clutch can contain up to 5,750 eggs. Its tadpoles are carnivorous and eat other tadpoles (including their own species).

The negative impact of these species

- **Biodiversity loss:** Invasive alien species are a major driver of biodiversity loss. In fact, an analysis of the IUCN Red List shows that they are the **second most common**

threat associated with species that have gone completely extinct, and are the most common threat associated with extinctions of amphibians, reptiles, and mammals.

- **Change in the ecosystem:** Invasive alien species can also lead to changes in the structure and composition of ecosystems leading to significant detrimental impacts to ecosystem services, affecting economies and human wellbeing. For example, the water hyacinth *Eichhornia crassipes*, a native to South America is spreading across Africa, Asia, Oceania, and North America. It is a fast-growing floating aquatic plant forming dense mats on the water surface, limiting oxygen and preventing sunlight reaching the water column. Infestations have led to reduced fisheries, blocked navigation routes, increased cases of vector-borne diseases, reduced hydropower capacity and affecting access to water.
- **Loss of Habitat:** Invasive species can have a number of negative impacts on the areas that they invade. Perhaps the most significant of these is the widespread loss of habitat.
- **May kill a large number of endemic species or may lead to extinction:** Burmese pythons, for example, are top predators in the Everglades. As such, they have decimated local mammal and bird populations. Capable of consuming deer and even alligators, these creatures eat virtually any animal they encounter in the Everglades. **The Case of Bullfrogs introduced in Andaman and Nicobar is another example for it because these Bullfrogs are invasive in nature and ate native wildlife including fish and lizards. Even in the developmental stages, the large bullfrog tadpoles eat other native frog tadpoles, finds a study.**
- **Lead to resource crunch:** Invasives can also threaten native species by outcompeting them for resources. Asian carp introduced into the United States outcompete native fish for both food and space, leading to large declines in native fish populations.

- **Impact on Human health:** Invasive species can also impact human health when these species may accumulate toxins in their tissues when other organisms prey on these species, the toxins are passed up the food chain and can also enter animals consumed by humans. Infectious disease agents may themselves be invasive species or may be introduced by invasive vectors (e.g. introduced mosquitoes carrying malaria). West Nile Virus is an example of this
- **Economic cost:** In addition to these impacts, invasive species can also have enormous economic costs. For example threat to fisheries by **Water Hyacinth**.

Managing invasive species

- In the last decade, there have been efforts to compile lists of invasive plant species in India and to study the impacts of invasive species in different parts of the country. In 2009, the Indian Council for Forestry Research and Education set up a Forest Invasive Species Cell to develop capacities for invasive species management and to create a database on invasive species.
- An integrated forest protection scheme was devised to include the management of invasive species. The last tiger census conducted by the National Tiger Conservation Authority included a survey of the distribution of a subset of invasive plants in tiger landscapes across the country. And the 12th five-year plan proposed a national invasive species monitoring system.
- We have a number of different legislations relating to invasive species. Some of these were enacted long before invasive species were a global concern – but have since been amended to include invasive species. An indicative, though incomplete, list includes;
 1. The Plant Quarantine (Regulation of Import into India) Order 2003.

2. The Destructive Insects and Pests Act, 1914 (and amendments).
3. Livestock Importation Act 1898 and the Livestock Importation (Amendment) Ordinance, 2001.
4. Environment Protection Act 1986 and
5. The Biological Diversity Act 2002.

- So also, we have a number of different agencies charged with preventing the introduction of invasive species and for management and control of invasive species. These include the Ministry of Environment Forests and Climate Change, the National Bureau of Fish Genetic Resources, the Plant Quarantine Organisation of India and various departments of the Ministry of Agriculture.