IMPACTS OF INVASIVE ALIEN SPECIES - GS III MAINS

Q. Invasive Alien Species (IAS) are one of the five major direct drivers of biodiversity loss globally. Discuss the characteristics of IAS and analyse the impacts of it particularly in the Indian conditions. (15 marks, 250 words)

News: *Bioinvasions are a global threat to ecosystems*

What's in the news?

- Over 3,500 harmful invasive alien species have been introduced into regions and biomes around the world by human activities, says an assessment report.

Key takeaways:

- The global economic cost of invasive alien species, that negatively impact nature and people, exceeded $423 billion annually in 2019. Costs have at least quadrupled every decade since 1970.
- About 60% of species extinctions are attributable to invasive alien species either solely or in combination with other drivers.
- About 90% of documented global extinctions of native species, attributed mainly to invasive alien species, have occurred on islands, especially remote islands.

Invasive Alien Species:

- Invasive Alien Species (IAS) are species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity.

Features:

- Invasive Alien Species (IAS) occurs in all taxonomic groups, including animals, plants, fungi and microorganisms and can affect all types of ecosystems.
- While a small percentage of organisms transported to new environments become invasive, the negative impacts can be extensive and over time, these additions become substantial.
- For a species to become invasive, it must successfully out-compete native organisms, spread through its new environment, increase in population density and harm ecosystems in its introduced range.

Characteristics:

- Rapid reproduction and growth
- High dispersal ability
- Phenotypic plasticity (ability to adapt physiologically to new conditions)
- Ability to survive on various food types and in a wide range of environmental conditions.

Examples of Invasive Animal species:

- Indian Bullfrog – Andaman and Nicobar
- Papaya Mealy Bug – Assam
- Amazon sailfin catfish – West Bengal
- Cannibal Snail / Rosy wolf snail – Indian Ocean
- African apple snail – Andaman and Nicobar

Impacts of Invasive Alien Species:

1. Threat to Biodiversity:

- IAS are one of the five major direct drivers of biodiversity loss globally, alongside land and sea use change, direct exploitation of organisms, climate change and pollution.
- IAS have been a major factor in 60% and the only driver in 16% of global animal and plant extinctions that have been recorded and at least 218 invasive alien species have been responsible for more than 1,200 local extinctions.

2. Economic Cost:

- IAS has at least quadrupled every decade since 1970, as global trade and human travel increased.
- In 2019, the global economic cost of invasive alien species exceeded $423 billion annually.

3. Impact on Food Supply:

- The reduction of food supply is the most common impact of alien invasive species.
- Caribbean false mussels have damaged locally important fishery resources in Kerala, by wiping out native clams and oysters.

4. Spread of Diseases:

- IAS like *Aedes albopictus* and *Aedes aegyptii* spread diseases such as malaria, Zika and West Nile Fever.

5. Amplifying the Impact of Climate Change:

- Invasive alien plants, especially trees and grasses, can sometimes be highly flammable and promote more intense fires.
- IAS can reduce the resilience of natural habit, agricultural systems and urban areas to climate change.

6. Geographical Impact:

- 34% of the impacts of biological invasions were reported from the Americas, 31% from Europe and Central Asia, 25% from Asia and the Pacific and about 7% from Africa.

7. Threat Concentration:

- Most negative impacts are reported on land (about 75%) with considerably fewer reported in freshwater (14%) and marine (10%) habitats.
- Invasive alien species are most damaging on islands, with numbers of alien plants now exceeding the number of native plants on more than 25% of all islands.

8. Threat Management:

- Only 17 percent have enacted specific national laws or regulations for IAS management.
- 45 percent of all countries do not invest in the management of IAS. It escalates the threat of IAS spilling over into neighbouring states.

Impact of Invasive Alien Species (IAS) on India:

India stands in second place after the US on the list of invasion-cost bearing countries. Invasive alien species cost the Indian economy $127.3 billion (Rs. 8.3 trillion) in the last 6 decades. IAS cost the Indian economy $127.3 billion in the last 60 years.

- ***Lantana camara*:** Its invasion has resulted in the scarcity of native forage plants for wild herbivores; it has invaded more than 40% of India's tiger range.
- ***Prosopis Chilensis*:** A drought-resistant plant native to the arid regions of South American countries is threatening native vegetation of islands in the Gulf of Mannar Biosphere Reserve.
- ***Prosopis juliflora*:** It is a water-guzzling invasive species which extracts maximum water from the ground impacting the groundwater levels adversely affecting local biodiversity and ecology.

Global Initiatives:

- **Kunming-Montreal Global Biodiversity Framework (KMGBF):** Under it, the world has to prevent and reduce the rate of introduction and establishment of IAS by at least 50 per cent by 2030.
- **Convention on Biological Diversity (CBD - 1992):** Adopted at the 1992 Earth Summit in Rio de Janeiro, it recognizes invasive alien species as a major threat to the environment, second only to habitat destruction.
- The **IUCN SSC Invasive Species Specialist Group (ISSG)** aims to reduce threats to ecosystems and their native species by increasing awareness of ways to prevent, control or eradicate IAS.
- **IUCN has developed knowledge platforms:**
    - The Global Invasive Species Database (GISD) and the Global Register of Introduced and Invasive Species (GRIIS).

Initiatives towards Invasive Alien Species in India:

- **Establishment of the National Biodiversity Authority** to regulate and control invasive species.
- Development of the **National Biodiversity Action Plan (NBAP)** to address the issue of invasive alien species.
- Implementation of the **Invasive Alien Species Management Program** to raise awareness and promote early detection and rapid response to invasive species.
- **Plant Quarantine (Regulation of Import into India) Order 2003:** Under this, any import of plants or seeds into the country should be inspected for the potential risk of pests.
- **Wildlife (Protection) Amendment (WPA) Bill 2021:** It provides for a regulatory framework for IAS in the Indian environmental legislative regime.

WAY FORWARD:

1. Incorporating IAS in Climate Change Policies:

- Climate change should be explicitly incorporated into risk assessments of IAS, to help identify those alien species that could become a threat in the future.

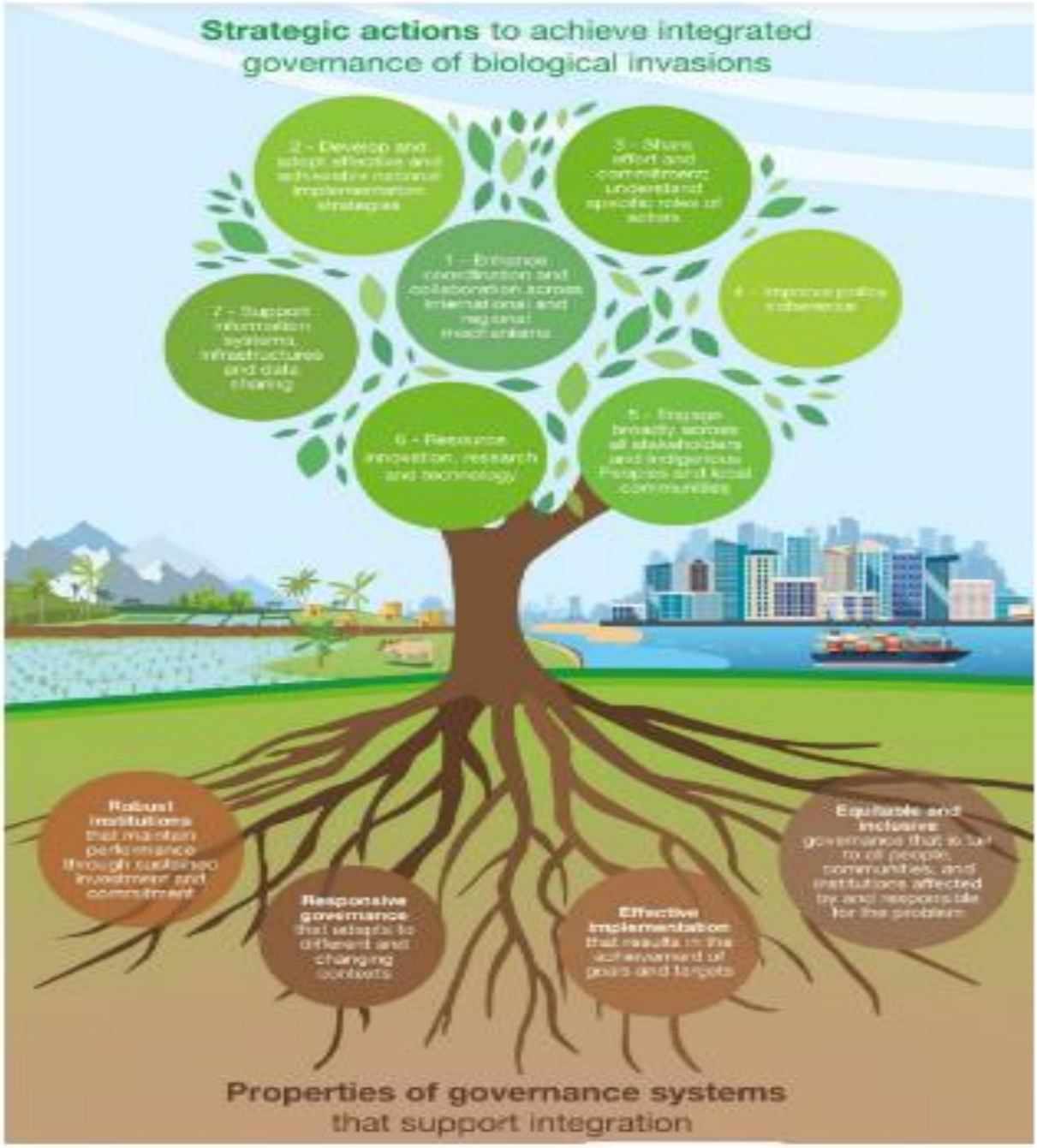
- Example: Native tree species should be used for carbon sequestration or erosion control rather than alien species such as Acacia or Eucalyptus.

2. Mapping Vulnerability:

- Ecosystems need to be prioritised according to their vulnerability to climate change and IAS and measures need to be established for preventing IAS introduction.

3. Prevention Measures:

- Border biosecurity and strictly enforced import controls has worked in controlling the spread.
- Example: Success has been achieved in Australasia in reducing the spread of the brown marmorated stink bug.



4. Protecting Marine and Connected Water Systems:

- Preparedness, early detection and rapid response are shown to be effective at reducing rates of alien species establishment.

5. Surveillance of New Alien Species:

- The Plant wise Plus programme in Australia assisted small holder farmers in Africa, Asia and Latin America in detecting new alien species.

6. Eradication:

- It has been successful and cost-effective for small and slow-spreading IAS, in isolated ecosystems such as islands.
- Examples: French Polynesia where the black rat and rabbit (have been successfully eradicated.

7. Containment:

- IAS must be contained and controlled in land-based and closed water systems as well as in aquaculture.
- Containment of the IAS Asian tunicate in aqua-cultured blue mussels in Canada.
- Introducing a rust fungus to control bitter vine in the Asia-Pacific region has been effective with success in more than 60% of known cases.

8. Involvement of Local Communities:

- Successful eradication programmes depend on the support and engagement of stakeholders and Indigenous Peoples and local communities.