Woody Encroachments in Grasslands

Why in News?

A study in 'Global Change Biology' found that increased tree cover in savannahs and grasslands has led to a more than 20% decline in native grassland bird populations, particularly in the African Savannah.

What are grasslands?

- **Grassland**- Grasslands are ***large open areas*** where grass is the dominant plant species.
- They cover nearly ***40% of the earth's total landmass***, and are home to many endemic and at-risk species of plants and animals.
- **Occurrences** – They occur in both *tropical and temperate* regions.
- **Tropical Grasslands (Savannahs)** – They are found in regions *near the equator*, primarily in Africa, South America, and Australia.
- It has warm temperatures year-round with distinct wet and dry seasons and dominated by grasses with scattered trees and shrubs.
- Home to megafauna like elephants, lions, giraffes, and rhinoceroses.
    - Notable examples include the Serengeti in Africa.
- **Temperate Grasslands –** They are found in *mid-latitude regions* such as North America, South America and Eurasia.
- It is characterized by hot summers and cold winters with moderate rainfall and are dominated by a *variety of grasses with few trees*.
- It hosts species like bison, antelope, and various rodents and birds.
    - Examples: North American prairies and Eurasian steppes



- **In India** – Grasslands occur across different climatic regimes like
  - **High-altitude Shola grasslands** - Western Ghats
  - **Arid Grasslands** – Western parts and interior India
  - **Floodplain Grasslands** – Himalayas belt
- **Role** – They play a crucial role in supporting biodiversity and providing ecosystem services.
- It includes *megaherbivores* like elephants, rhinoceroses, and buffaloes in Africa and Asia and grassland birds like the *bustards and floricans*.



What are the threats to grasslands?

- **Conversion to agriculture-** Grasslands are often converted into agricultural land to meet the growing demand for food production.

- **Erosion-** Without the deep root systems of grasses to hold the soil in place, grasslands are susceptible to erosion.
- **Large-Scale development-** Urbanization and infrastructure projects encroach on grassland areas, leading to habitat fragmentation and loss.
- **Overgrazing-** Overgrazing reduces biodiversity, compacts the soil, and makes the land more vulnerable to erosion.
- **Woody encroachment-** An often-overlooked threat is the increase of tree and shrub cover, known as woody encroachment.

What is woody encroachment?

- **Meaning** – It entails the conversion of open habitats to habitats with greater tree cover and/or shrub density.

> *Open ecosystems are characterised by a grassy understory and a scattering of native tree species. They are generally maintained by certain natural and human activities like grazing and fire, which are called* ***disturbance regimes*** *because they work in tandem to limit the growth of tree species.*

- **Causes** – When there is *disruptions in disturbance regimes*, trees have the calm they need to establish themselves and start woody encroachment.
- *Fire suppression*, fragmentation, and *variations in rainfall* further contribute especially in South America, Australia, and Africa.
- *Colonial classification* of open ecosystem as 'wastelands' to promote timber cultivation.
- *Tree plantation drives* leads to encroachments.
    - **In Banni grasslands** – Gujarat government planted invasive species *Prosopis Juliflora in Banni grassland* from 1961 to combat desertification & provide firewood to communities that transformed swaths of the grasslands into a *Prosopis woodland*.
    - **In the Shola grasslands** – *Eucalyptus plantations* have run encroached
    - **In wet terai grasslands of the Himalaya** – The Malabar silk-cotton tree has been running riot here.
- *Increased atmospheric CO2* due to climate change favors tree growth over grasses because the C3 photosynthetic pathway used by trees is favored under high CO2 conditions.
- Once trees become dominant in a system, they may *further suppress grasses through shading* and fire suppression.
- **Threat** – It is widespread across most ecosystems.
- In India, woody encroachments are observed *and rampant even inside protected areas* such as national parks and sanctuaries.
    - The cover of grassland habitats had ***shrunk by 34%*** while *tree cover in these places had increased by 8.7%.*
- **Impacts** – The end result is the ***homogenisation of an ecosystem***, meaning a diverse, multi-layered ecosystem turns into a uniform layer of woody plants.
- It *disrupts the natural balance* and biodiversity of these ecosystems.
- Succession of woody species *changes the soil conditions*, which changes the grass

species and faunal association.
- It invite *increased predation* especially of the specialist birds' nests.
- There is dramatic decline of grassland birds in these regions which is mainly studied in Southern African Countries of South Africa, Eswatinii and Lesotho
    - Of the 191 species they analysed from 2007 to 2016, declining population trends prevailed in 121.
    - Of these, the decline of 34 species correlated with woody encroachment.
- For similar reasons, it also *brought down the population of grassland specialist rodents* in the Banni grasslands of Kutch which incurred a ***survivability penalty***
    - The grass allowed them to hide from predators, but as trees cropped up, they spent more time keeping vigil and less time feeding

What lies ahead?

- Develop comprehensive evidence of woody encroachment's impact on ecosystem and monitor open ecosystems in long term because they provide valuable fine-scale information.
- Acknowledge the historical presence and ecological importance of grasslands is vital.
- Dismantle colonial terminologies like "wastelands" that misclassify grassland ecosystems.
- Implement informed policies and practices to protect these ecosystems for future generations.
- Promote agroecological methods and rotational grazing systems.
- Follow successful restoration projects, like those in Maharashtra, demonstrate the potential for grassland conservation.

References

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3. NLM | Recent advances in understanding grasslands

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