COURTING THE ENVIRONMENT

ECOLOGY AND ENVIRONMENTAL RESEARCH FOR LAWYERS

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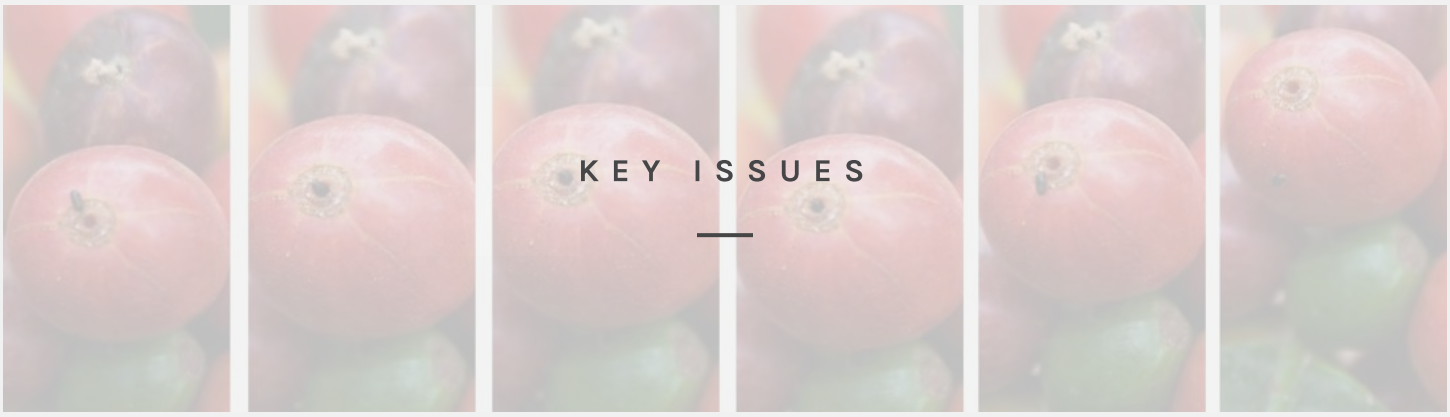
Invasive Alien Species: Cost & Consequences

Photo: Tiger amidst Parthenium by Rohit Varma - Wikimedia Commons



KEY ISSUES

01.

Alien invasions of another kind

Invasive alien species are non-native plants, animals or insects that have been, intentionally or by accident, introduced to an area, causing significant impact

02.

Threats posed by invasives

Invasive species can drive native species to extinction, deplete water resources, increase risk of fire, and alter habitats to the detriment of wildlife and human health

03.

High economic cost

Invasive species pose significant risks to India's economy, having cost, by conservative estimates, about Rs 8,30,000 crores between 1960 to 2020

04.

Impact on human well-being

Invasive alien species impact local livelihoods by damaging native species and habitats, and/or reducing availablity of resources such as water, fish, or honey

05.

Barriers to tackling invasives

India does not have a national policy on invasive species, the absence of which reflects in poor preventive and management measures

Photo: Michael.C.Wright; Dinesh Valke; Greg Hume - Wikimedia Commons

COSTLIEST INVASIVE ALIEN SPECIES


Aedes aegypti

01
Yellow fever mosquito
Rs 64,569 crores
First recorded: prior to 1963

Dengue, Chikungunya, Zika fever


Hypothenemus hampei

02
Coffee borer beetle
Rs 28,570 crores
First recorded: 2008

Agricultural pest

03
Small canary grass
Rs 7,426 crores
First recorded: 1970s

Agricultural weed


Phalaris minor

04
Lantana
Rs 2,400 crores
First recorded: 1809

Forest and grassland invasive


Lantana camara


Micania micrantha

05
Bitter vine
Rs 2,325 crores
First recorded: 1950s

Agricultural and plantation weed


Parthenium hysterophorus

06
Congress grass
Rs 900 cores
First recorded: 1950s

Agricultural weed and allergen

07
Fall armyworm
Rs 300 crores
First recorded: 2018

Agricultural pest


Spodoptera frugiperda

08
Desert locust
Rs 225 crores
First recorded: 1812

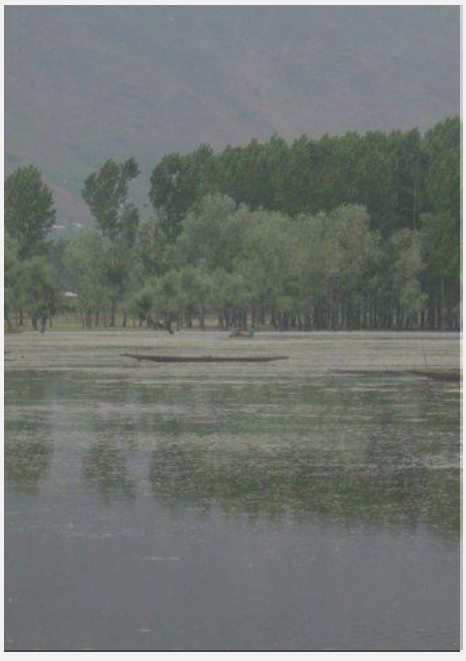
Agricultural pest


Schistocerca gregaria

Bang and Lahiri (2021) Research Square - Preprint

Photo: Mehrajmir13; Muhammad Mahdi Karim; L Shyamal; Stephen Laymon; Ramjit Tudu; Vengolis; Yercaud-elango; Donald Hobern, Biddanda Somaya Nanjapa - Wikimedia Commons

RESEARCH SUMMARIES



Water

Impacts of plant invasions on terrestrial water flows in South Africa

Biological Invasions in South Africa

Le Maitre and others (2020)

Many invasive tree species, such as prosopis, wattle, *and* eucalyptus place tremendous pressure on water resources, and play a significant role in depleting groundwater. The targeted clearing of such trees is an accepted management practice in various parts of the world, with countries like South Africa instituting the 'Working for Water' programme, where removal is done in conjunction with providing employment for locals, while making productive use of the biomass extracted.

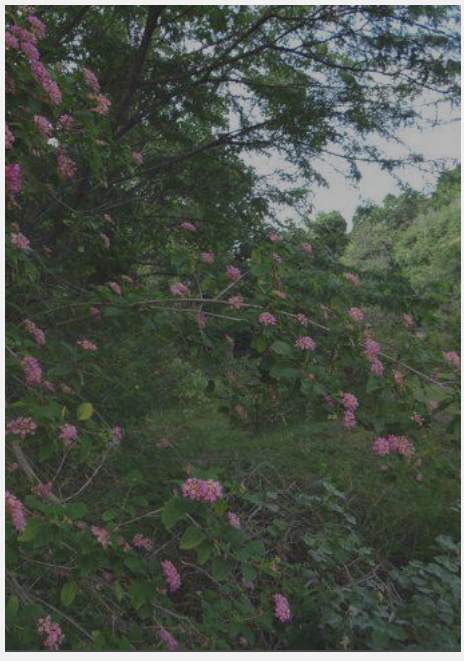
Fire

Ecology and impacts of the invasive species, Lantana camara, in a social-ecological system in South India

Human Ecology

Sundaram and others (2012)

Invasive species like lantana increase risk of forest fires. Fires in lantana-infested forests tend to be more severe, and impact native species. Mature lantana are unaffected by fire, and easily resprout. Native species are thus edged out, and lantana proliferates. Invasive species go through three phases - arrival, establishment, and spread. Local knowledge about controlled fires in the second phase has been supported by studies showing that such fires kill lantana seeds, preventing establishment.



Biodiversity

Lantana camara invasion in a heterogenous landscape: patterns of spread and correlation with changes in native vegetation

Biological Invasions

Sundaram and others (2011)

Invasive species impede processes like nitrogen cycling that is necessary to keep natural habitats healthy. They distrupt long-standing interactions between native plants and their pollinators, as well as underground organisms such as fungi. Invasive species compete with native species for space and light, and cause reduction in their population over time, especially in deciduous forests. This study shows that the presence of lantana has reduced the prevalence of native species.

Photo: Maxx786; gnozef from netherlands; Timothy Gonsalves - Wikimedia Commons

RESEARCH SUMMARIES

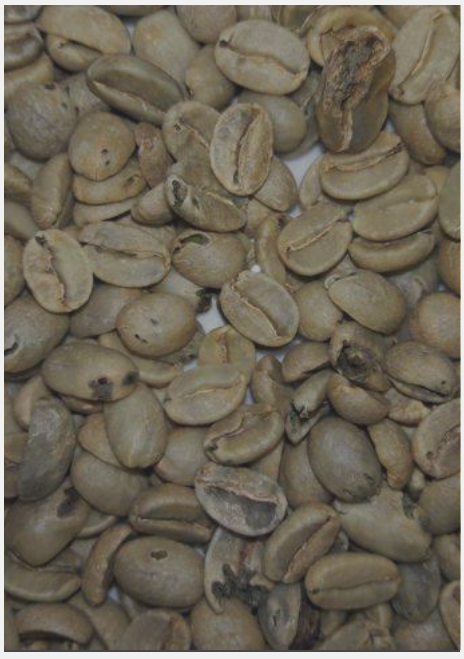
Livelihood Impacts

The impact of invasive aquatic plants on ecosystem and human well-being in Wular Lake, India

Regional Environmental Change

Keller et al (2018)

Wular Lake in Kashmir is overrun by *Azolla cristata* and alligator weed since about 2002. These invasive weeds form dense floating mats that obstruct light in lower depths and reduce oxygen availability, with consequences for native plants and aquatic animals. It creates habitat for disease vectors (eg. mosquitos), greater sedimentation and pose flood risks. The livelihoods of local fishing communities are disrupted due to reduced fish availability and physical barriers to boat movement.



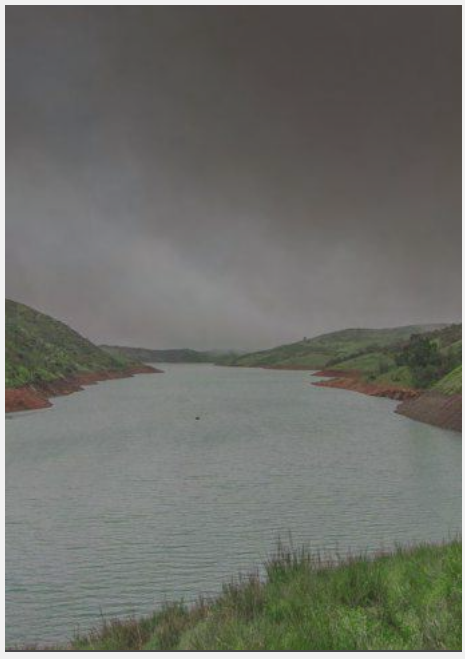
Economic Costs

Fragmented yet high economic costs of biological invasions in India

Research Square (Pre-print)

Bang and others (2021)

The most common invasive alien species in India include *Parthenium hysterophorus* (carrot/congress grass), *Leucaena leucocephala* (river tamarind), and *Oreochromis mossambicus* (tilapia). The economic costs of invasives are hard to estimate since their impacts straddle sectors ranging from health to tourism. Nevertheless, their estimated annual economic cost of Rs 15,784 crores is considerably higher than the annual budget of the Ministry of Environment.



Flood Risks

Exotic plantations increase risks of flooding in mountainous landscapes

ESSOAr

Nayak and others (2020)

The Upper Bhavani region of the Nilgiris District of Tamil Nadu is where a major tributary of the Kaveri, the Bhavani, arises. During rains, plantations comprised of the invasive species, wattle, do not retain as much water in the soil as the native grassland and tree species. This has the potential to increase flooding in the monsoon season, while also reducing water flows in the dry periods with consequences for hydropower generation.

Photo: Mohammad Nazeer Lone; Forest & Kim Starr; Michael Varun - Wikimedia Commons

Photo: Dinesh Valke - Wikimedia Commons

WHY 'COURTING THE ENVIRONMENT' ?

In a public interest litigation before a High Court on an environmental matter, the Hon'ble Court remarked that the petitioners had not placed adequate scientific evidence supporting their case. With the wealth of environmental research that happens in reputed scientific institutions in India, it is a shame that it does not often reach environmental lawyers who need it the most. COURTING THE ENVIRONMENT is a triannual newsletter that attempts to address this deficit by conveying environmental research to a legal audience.

HIGHLIGHTS

Invasive alien species are a major driver of biodiversity loss and extinction. India is potentially at great risk from its impacts

LESSONS

Invasives have implications for human health, livelihoods, and pose significant economic costs, in addition to ecological ones

CHALLENGES

A national policy on invasive alien species needs to suggest strategic and stringent measures for prevention and management

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