

“Covid-19 outbreak shows that society ends up paying high economic and social cost of violating natural environment”

Deforestation drives epidemics

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China vowed to keep wildlife off the menu, a tough promise

(Deccan Herald, 8 June 2020)

“Mao has over the past 5 years built a viable farm in southern China with 1100 bamboo rats, a chubby, edible rodent that is a delicacy in the region.

Then, in February, China’s government suspended the sale and consumption of wildlife, farmed or captured, abruptly freezing a trade identified as the likely source of the outbreak.”

The **disease causative agents** behind majority of the outbreaks in the past including **yellow fever** (Africa, South America), **dengue** (pan tropical), **Chikungunya** (Africa, south and southeast Asia), **Ebola** (Africa), **HIV** (worldwide), **Nipah** (South Asia), **SARS** (Southeast Asia), **Malaria** (Africa, Southeast Asia, South America) and **Lyme disease** (worldwide) **are forest denizens**

At their initial outbreak is attributable to deforestation and forest fragmentation

- **Nipah virus**, first isolated in 1999, caused more than 100 human deaths (Malaysia, 1998).
- Nipah virus had **infected humans through reared pigs**.
- Pigs had nibbled on the fruits eaten by fruit bats (reservoir host).
- **Fruit bats were displaced by deforestation** carried out for cultivation of palm oil plantations and pig farming.
- **In May 2018, Nipah virus claimed 21 lives in Kerala state.**

According to the *World Health Organization...*

“...two-thirds of known human infectious diseases are shared with animals, and the majority of recently emerging diseases are associated with wildlife”

Kyasanur Forest Disease (KFD)

(KFD spread is related to forest loss)

- KFD (monkey fever) is endemic to the Western Ghats
- A **tick** - *Haemaphysalis spinigera* - **found in forest margins** transmits KFD virus to humans.
- During the past 5 years, KFD has expanded its range throughout the Ghats and beyond.
- KFD has **potential as an emerging infectious disease** (EID) in India.

Rich “biodiversity may serve as a protective factor for preventing transmission, and maintaining ecosystems may help to reduce exposure to infectious agents.”

(WHO and CBD review of state of knowledge: BD and human health 2015)

Precluding the emergence of infectious diseases through forest conservation is a recognized novel **ecosystem service of forests**

How is high biodiversity useful?

Experts opine that in a high biodiversity forest, availability of number of other potential victims of the disease agent creates a “dilution effect” reducing the chances of infection to humans

There exists a dynamic balance of biodiversity in a natural forest ecosystem

Disease causative agents (**virus, bacteria or parasites**) that have **co-evolved** with their **reservoir hosts** (**mosquitos, ticks, rodents, bats and other wild animals**) are all part of dynamic balance of biodiversity in a forest ecosystem

Disturbing forests disturbs this balance, which has implication for hosts and agents and thus for the disease outbreak

Forest habitats are disturbed for ...

- Roads, power lines, dams and canals
- Mining and quarrying
- Human habitations and industrial use
- Extension of agriculture
- Grazing livestock

Disturbance or loss of forest habitat results in...

1. Changes in local factors
(Sunshine / temperature / moisture / wind)
2. Disturbances in the balance of biodiversity

Implication: Increased exposure of human beings to disease agents

How the exposure of humans increases?

1. Reservoir host **may shed higher pathogen load** through saliva, urine and fecal matter under stress of disturbance.
2. **Populations of host may increase**, and so the scope for pathogen spillover.
3. Reservoir **host species can disperse** from the disturbed forest habitat along with the pathogen load carrying disease to new areas.

How the exposure of humans increases?

4. Fresh habitat opportunities can arise that may favor breeding and result in increased abundance of host species locally.
5. Disease causing agents can find alternative hosts in humans and their livestock that use such disturbed forest habitat.
6. Enhanced interaction of livestock with the host wild animals can facilitate spillover of disease causing agents to humans.

Intensification of risk ...

when people venture into forest habitats for:

- collection of forest produce
- cattle grazing
- bush-meat hunting
- tourism

Such risk is further compounded due to migration of more-vulnerable poor people into opened-up forest areas without adequate housing, water, medical and sanitation facilities

Climate change adds new dimensions to forest-linked disease outbreak

As changes in temperature, humidity, drought frequency and rainfall distribution, and its impacts on forests, would modify:

- disease incidence / rate
- range
- seasonality
- distribution of disease agents and their hosts
- human-disease host interactions

Way ahead...

Halting deforestation, and defragmenting forests,
can potentially strengthen the
**environmental basis of economic
development
and
insures against the outbreak of
diseases**

We understand...

There lurks a real risk of next pandemic emerging from forests

**Epidemiologists suggest
preservation of the health of our
forest ecosystems to secure our
own**

Finally...

Forest cover: 71.22 mha

Tree cover: 9.50 mha

**Total Forest & Tree cover
24.56% of geographical
area**

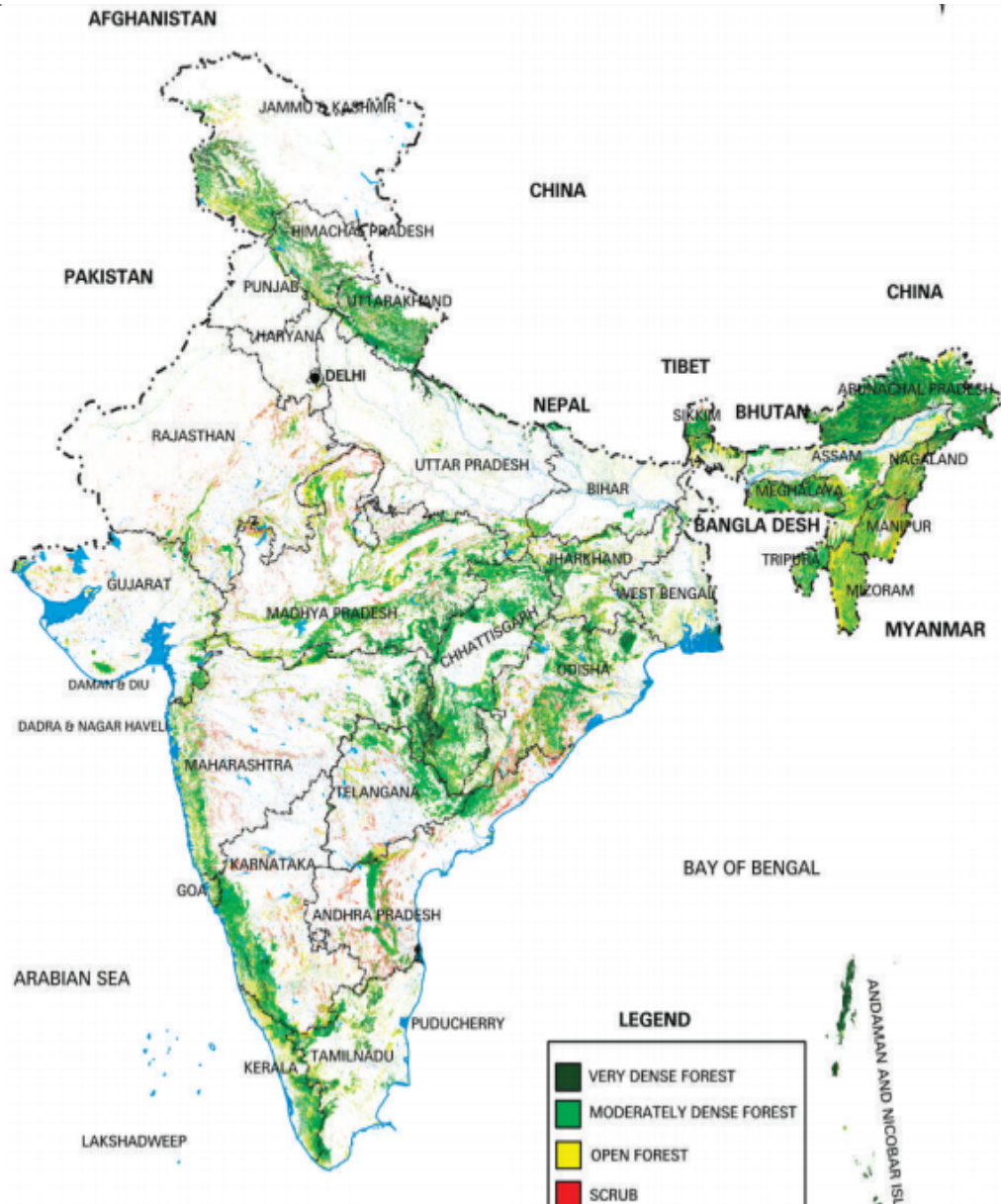
Major forest types: 16

Biodiversity hotspots

1. Western Ghats
2. Northeastern region
3. Northern Himalayas

**Mangrove-Dry scrub-
deciduous- wet evergreen-
high altitude alpine forests
are found**

Status of Indian forests...



Thanks

A close-up photograph of a bat with its wings fully extended, showing the intricate structure of the wing membranes and the underlying bone framework. The bat's body is covered in brown fur, and its face is visible, showing small ears and a slightly open mouth with small teeth. The background is solid black, making the bat stand out.

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