



Invasive Plant Species Introduced by Kerala Floods

Floods and landslides in Kerala have brought several alien invasive species of plants into the State's water bodies, posing a threat to native biodiversity and the aquatic environment.

- The physical routes and paths formed due to landslides and the overflow of rivers had paved the way for the establishment of primary colonies of invasive species like **Nila grass** (*Mimosa diplotricha*), **Mikania** (*Mikania micrantha*), **Lantana** (*Lantana camara*) and **Siam weed** (*Chromolaena odorata*).

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.
- Invasive species alter the environment they invade and are difficult and expensive to control after they colonise a landscape, having **phenotypic plasticity** (the ability to adapt to environmental stress).
- Invasive plant species **transform the soil structure** and micro environment to their advantage by producing **allelochemicals** which cause the destruction of native species and local biodiversity.
- Allelochemical is produced by a living organism that exerts a detrimental physiological effect on individuals of another species when released into the environment. For example:
 - An invasive species **Anthemis cotula** can excrete allelochemicals to inhibit seed germination and retarding seedling growth of its native competitors.
 - **Black Walnut** produce allelochemical called **Juglone** which adversely affects plants like tomatoes, pepper, potato etc.

Threats to Native Ecosystem of Kerala

- The spread of the invasive species could threaten cultivable land and wildlife habitats alike. For instance:
 - Invasive species like the **water hyacinth** (*Eichhornia crassipes*) and **giant salvinia** (*Salvinia molesta*), present in the **backwaters of the Kuttanad region**, had started **colonising paddy fields**, cultivated lands and other isolated water bodies in nearby areas.
- **Kole wetland** (part of Vembanad-Kole wetlands, a Ramsar site) in Thrissur, has been colonised by invasive plants, especially grass species, such as matamat (*Rhynchospora corymbosa*), desho grass (*Pennisetum pedicellatum*), giant salvinia and water hyacinth which **may lead to the conversion of marshy wetlands into dry land**.
- In many areas of Thrissur, Palakkad, Wayanad and Idukki districts, seeds of invasive species from mountainous areas have spread to new spaces formed by landslides which **can grow very fast in landslide-affected areas** by using available nutrients, while native species cannot adapt to such

conditions.

- In **rubber plantations, cover crops** (species grown mainly to prevent soil erosion) like mucuna (*Mucuna bracteata*), a nitrogen-regulating plant, are more likely to establish themselves in the new areas and subsequently **spread into the forests** through the corridors created by landslides. This could **affect the soil and destroy the microhabitat of that area**.

Way Forward

- The threat of invasive species should be addressed in the process of **post-flood reconstruction** in the State.
- **Community participation** should be given importance in identifying and reporting the invasive species to Forest Departments.
- A **comprehensive survey** should be conducted by the Forest Department to identify the area and density of the spread of invasive species in wildlife sanctuaries, National Parks and Protected Areas.
- Adequate time and budget should be allocated to handle this herculean task.

Cartagena Protocol on Biosafety

- The **Cartagena Protocol on Biosafety** to the **Convention on Biological Diversity (CBD)** is an **international agreement** which aims to **ensure the safe handling, transport and use of living modified organisms (LMOs)** resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health.
- It was adopted in 2000 and entered into force in 2003.
- CBD recognize that there is an **urgent need to address the impact of invasive species**. It states that "Each Contracting Party shall, as far as possible and as appropriate, prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species".

Additional Information

- **Kuttanad Wetland Agriculture System** is the **only system** in India that favours **rice cultivation below sea level** in the land created by draining delta swamps in brackish waters.
- In order to safeguard and support the world's agricultural heritage systems, **Food and Agriculture Organization** (specialized agency of the United Nations) started an initiative for the identification and the dynamic conservation of **Globally Important Agricultural Heritage systems (GIAHS)** in 2002. These **traditional agricultural systems** represent models of sustainable agricultural production.
- Three recognised **GIAHS sites in India**:
 - **Kuttanad** Below Sea Level Farming System of Kerala
 - **Koraput** Traditional Agriculture of Odisha
 - **Pampore** Saffron Heritage of Kashmir

GROWTH-India's First Robotic Telescope

India's **first robotic telescope** and the **first one designed to observe dynamic or transient events** in the universe has started observing the skies.

- The telescope is located at the **Indian Astronomical Observatory (IAO) at Hanle in Ladakh**.
- The telescope is a joint project of the Bangalore-based **Indian Institute of Astrophysics (IIA)** and the **Indian Institute of Technology Bombay (IITB)**.

- It is fully funded by the **Science and Engineering Research Board (SERB)** of the Department of Science and Technology (DST) under the **Partnerships for International Research and Education (PIRE) project**, administered by Indo US Science and Technology Forum.
 - The primary goal of PIRE is to **support high quality projects** in which advances in research and education could not occur without international collaboration.
- Called GROWTH-India, the facility at Hanle is part of a multi-country collaborative initiative known as **Global Relay of Observatories Watching Transients Happen (GROWTH)** to observe **transient events in the universe**.
- The telescope also has the badge of being housed in the **one of the world's highest astronomical observatories** at 4,500 meters.
- The 70 cm robotic telescope joins other larger facilities at IAO in Hanle - the **Himalayan Chandra Telescope, the gamma-ray array telescope (HAGAR), and the imaging Cherenkov telescope (MACE)**.

Global Relay of Observatories Watching Transients Happen (GROWTH)

- The GROWTH program is a 5 year project, funded by the **National Science Foundation (NSF)**. NSF is a United States government agency whose mission includes support for all fields of **fundamental science and engineering, except for medical sciences**.
- It is an international collaborative network of astronomers and telescopes dedicated to the study of **short-lived cosmic transients and near-earth asteroids**.
- Cosmic transients are **energetic flashes of light** that are millions to billions of times the brightness of the sun, e.g. explosive deaths of massive stars, white dwarf detonations, etc.
- Key follow-up observations of fast-fading or fast-moving events must occur at night promptly after discovery but before the sun rises.
- Therefore, a **relay or network of telescopes spanning multiple longitudes (time-zones)** on earth is required to pass the baton amongst each other to **effectively extend the night-time darkness**.
- GROWTH enables detailed monitoring of events that would otherwise vanish before the next night.
- Its goals are **threefold**:
 - Search for **explosions in the optical regime** whenever **Laser Interferometer Gravitational-wave Observatory (LIGO) group detects a Binary Neutron Star merger**.
 - Study **nearby young supernova explosions**.
 - Study **nearby asteroids**.
- Universities and research institutes from the US, the UK, Japan, India, Germany, Taiwan and Israel are part of the initiative.

IMO Guidelines on Shipping Fuel

The **International Maritime Organization (IMO)** adopted an amendment that supports a reduced limit on sulphur in ships' fuel oil.

- The IMO adopted the new 0.50% limit from the current 3.50% on sulphur in ships' fuel oil.
- The new guidelines will be implemented from January 1, 2020, under **IMO's MARPOL treaty**.
- The limit is likely to have benefits for the environment as well as human health.

Pollution by Shipping

- **Discharge into air**
 - There are more than 52,000 ships sailing the ocean which burn more than 2 billion barrels of heavy fuel oil in one year. (Heavy fuel oil, a crude oil byproduct, contains sulfur

concentrations up to 1,800 times higher than the diesel fuel used for cars).

- **Ships contribute between 2 and 3 percent of the world's total greenhouse gas emissions**, through emission of sulphur dioxide, nitrogen oxides, and carbon dioxide.
- **Ballast Water Discharge**
 - Ballast Water Discharge by ships is responsible for the introduction of invasive species in the oceans.
 - The oceans take in the water from one port and discharge the water during the next port call thus introducing a variety of non-native species in the sea.
- **Sound Pollution:**
 - Growing levels of noise pollution in the ocean drive fish away from their habitat into their deaths. Sound Pollution also impacts the marine organism who rely on sound for communication, mating calls and catching prey.
- **Oil Spills and Chemical Discharges:**
 - Oil spills have huge and immediate economic, social, and environmental impacts.
 - Local people lose their livelihoods as fisheries and tourism areas are temporarily closed; the cleanup costs are enormous, and tens of thousands of marine animals and plants are killed or harmed.
 - Many ships illegally discharge bilge oil (a mixture of water, oil, lubricants, and other pollutants that collect in a ship's hold) before entering a port as this is cheaper than disposing of it legally at the port.
 - Dumped bilge oil accounts for nearly 10% of all oil entering the oceans each year.
 - Some of these chemicals are toxic, persistent, and bioaccumulative.
- **Collision with Wildlife:**
 - Ships cause physical and other damage: through dropping of anchors, wave disturbances, and striking of whales and other marine mammals.

International Convention for the Prevention of Pollution from Ships (MARPOL Treaty)

- MARPOL is one of the most significant **international marine environmental conventions**.
- The International Convention for the Prevention of Pollution from Ships (**MARPOL**) is the **main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes**.
- The MARPOL Convention was adopted on 2 November 1973 at IMO. The Protocol of 1978 was adopted in response to a spate of tanker accidents in 1976-1977.
- The current convention is a combination of the 1973 Convention and the 1978 Protocol, which entered into force on 2 October 1983.
- The Convention includes regulations aimed at preventing and minimizing pollution from ships - **and currently includes six technical Annexes:**
 - Annex I: Regulations for the **Prevention of Pollution by Oil**
 - Annex II: Regulations for the **Control of Pollution by Noxious Liquid Substances in Bulk**
 - Annex III: Prevention of Pollution by **Harmful Substances Carried by Sea in Packaged Form**
 - Annex IV: Prevention of Pollution by **Sewage from Ships**
 - Annex V: Prevention of Pollution by **Garbage from Ships**
 - Annex VI: Prevention of **Air Pollution from Ships**
- In 2011, IMO became the first international regulator for a transport sector to adopt globally binding energy efficiency requirements, which apply to all ships globally, regardless of trading pattern or flag State, aimed at reducing greenhouse gas emissions from international shipping.

International Maritime Organization

- The International Maritime Organization is a **specialized agency of the United Nations**.
- IMO is responsible for **measures to improve the safety and security of international shipping and to prevent pollution from ships**.
- It is also involved in legal matters, including **liability and compensation issues and the facilitation of international maritime traffic**.
- It was **established by means of a Convention** adopted under the auspices of the United Nations in Geneva **on 17 March 1948** and met for the first time in January 1959.

- It currently has 174 Member States.
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BASIC Nations Push for 'Climate Finance'

Ahead of the **United Nations Conference of Parties (COP24) in Katowice, Poland, the BASIC (Brazil, South Africa, China and India)** countries said that they would continue to push developed countries on their commitment to providing \$100 billion annually from 2020.

- Earlier at **COP21 of UNFCCC held at Paris in 2015**, in accordance with the principle of **"common but differentiated responsibility and respective capabilities"**, developed countries had committed to contribute **\$100 billion each year** to help poorer and developing economies fight climate change through mitigation as well as adaptation.
- However, not much progress has been made on raising the \$100 billion a year that is intended to help the poorer nations. Countries still need to agree on **what constitutes climate finance**.
 - **E.g.:** Whether investments made by **private companies** in developed countries in new green technology will be considered, or whether **improving efficiency** in a thermal plant, etc.
- The four nations also took note of the findings of the [Intergovernmental Panel on Climate Change \(IPCC\) special report on global warming of 1.5C](#), which highlights the **high vulnerability of developing countries** to climate change effects and **high resultant costs of adaptation**.
- BASIC is a group of four large countries – **Brazil, South Africa, India and China. It was formed in 2009.**
- Recently, India also hosted meetings with a group of countries called the **LMDC (Like Minded Developing Countries-India, China, Venezuela, Iran, etc.)** to discuss issues related to climate change.

Climate Finance

- It refers to **local, national or transnational financing**—drawn from public, private and alternative sources of financing—that seeks to support **mitigation and adaptation** actions that will address climate change.
- To facilitate the provision of climate finance, the United Nations Framework Convention on Climate Change (UNFCCC) states that the operation of the financial mechanism can be entrusted to **one or more existing international entities**.

Global Environment Facility (GEF)

- It has served as an operating entity of the financial mechanism since the **UNFCCC's entry into force in 1994**.
- GEF is an international partnership of 183 countries, international institutions, civil society organizations and the private sector that addresses global environmental issues.
- It is based in **Washington DC, United States**.
- The GEF also manages **two special funds**, viz. the **Special Climate Change Fund (SCCF)** and the **Least Developed Countries Fund (LDCF)**.

Green Climate Fund (GCF)

- Green Climate Fund is the financial mechanism of the UNFCCC, established at **Conference of Parties (COP-16) in Cancun, Mexico 2010**.
- It was set up by the 194 countries who are parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2010, as part of the Convention's financial mechanism.
- **National Bank for Agriculture and Rural Development (NABARD)** and **Small Industries**

Development Bank of India (SIDBI) act as **National Implementing Entity (NIE)** of India for Green Climate Fund (GCF).

- The Fund pays particular attention to the needs of societies that are highly vulnerable to the effects of climate change, in particular Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States.
- The Fund's investments can be in the form of grants, loans, equity or guarantees.

Adaptation Fund (AF)

- This separate fund was established under the **Kyoto Protocol in 2001**.
- The Adaptation Fund is financed with a **share of proceeds from the Clean Development Mechanism (CDM)** project activities and other sources of funding.
 - The CDM allows **emission-reduction projects in developing countries** to earn **Certified Emission Reduction (CER) credits**, each **equivalent to one tonne of CO₂**.
 - These CERs can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol.
- The Adaptation Fund is **financed by a 2% levy on CERs** issued by the CDM.

Important Facts for Prelims (21st November 2018)

World Heritage Week

- World Heritage Week is marked around the world from November 19-25, after **UNESCO declared** the designated period a few decades ago.
- Its objective is to increase awareness about the preservation of invaluable heritage and celebrate the architectural and cultural legacy.
- **India currently has 37 UNESCO World Heritage Sites.**

Matibabu Device

- It is a **non-invasive test kit** used to **detect malaria**.
 - It is a low cost and reusable device that could be used to test for malaria instantly. It was **developed in Uganda**.
 - This device is called 'Matibabu', a word in Swahili which means "treatment".
 - Unlike current testing methods that require blood to be drawn for testing, **'Matibabu' is "bloodless"**.
 - The device is clipped onto a finger and 'using light and magnetism, a red beam of light scans the finger to detect changes in the colour, shape and concentration of red blood cells — all of which are often affected when the malaria parasite is present in the body'.
 - The **result is available within a minute** and sent to a mobile phone which is linked to the device.
 - Another key feature is that one **does not require specialized training** to use the device.

 - 'Matibabu' can provide an easy diagnosis of malaria in low-income areas such as Uganda.
 - The device and application won the first prize at 'Africa Prize for Engineering Innovation' 2018 — an award dedicated to engineering innovation on the continent.
 - 'Matibabu' has also been mentioned in Time magazine as one of 50 best inventions of 2018.
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