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PREFIRE (Polar Radiant Energy in the Far-InfraRed Experiment)

The first of a pair of climate satellites designed to study heat emissions at Earth's poles was launched.

- **Developed by** – NASA & the University of Wisconsin-Madison.
- **Launch service by** – ***NASA***
- **Aim** – To measure far-infrared (IR) radiation from the Earth's pole.
- **Mission** – To gather data on the *amount of heat, the Arctic and Antarctica radiate* into space and their influence on global climate.

A lot of the heat radiated from the Arctic and Antarctica is emitted as far-IR radiation with wavelengths of 3 µm to 1,000 µm within the IR range of electromagnetic radiation.

- It consists of ***2 shoebox-size cube satellites*** or CubeSats along with the spectrometer TIRS.

CubeSats *are essentially miniature satellites whose basic design is a 10 cm x 10 cm x 10 cm (which makes up for "one unit" or "1U") cube — just a little bigger than a Rubik's cube & weight not more than 1.33 kg.*

- Each of the PREFIRE satellites is a 6U CubeSat, measure around 90 cm in height and nearly 120 cm in width.
- **Thermal Infrared Spectrometer (TIRS)** — It features specially shaped-*mirrors and detectors* for splitting and measuring IR light.
- **Placement** – The 2 satellites will be placed in a ***near-polar orbit*** (a type of low Earth orbit) at an altitude of about 525 kms.
- **Significance** – It will help us understand the fundamentals of *Earth's heat balance*.

Earth's energy budget *is the balance between incoming heat energy from the Sun and the outgoing heat given off by the planet. The difference between them is what determines the planet's temperature and climate. The water vapour content of the atmosphere, along with the presence, structure, and composition of clouds, influences the amount of far-IR radiation that escapes into space from Earth's poles.*

- It will provide a detailed picture of how Earth's Polar Regions influence Earth's capacity to absorb and release energies.
- The data can be used to predict how Earth's ice, seas, and weather will change in a warming world and in *prediction of sea ice loss, ice sheet melt*, and sea level rise.
- It provides crucial *information to farmers* tracking changes in weather and water, fishing fleets working in changing seas, and coastal communities building resilience.

Reference

The Indian Express| Launch of PREFIRE Satellite

Oedocladium sahyadricum

New algal species discovered in Western Ghats.

> ***Phycology*** *is the science that studies all forms of algae, from very tiny microorganisms that float through the ocean to huge forests of seaweed.*

- This alga was found as a *thin mat of elongated strands* on damp soil.
- **Discovered in** – ***Kerala,*** where a species in the Oedocladium category has been recorded for the 1st time.
- **The name 'sahyadricum'** – It refers to the *Western Ghats,* also known as Sahyadri, which is rich in plant diversity and provides ideal conditions for the growth of terrestrial microalgae.
- **Unique features** – ***Dioecious*** (separate male & female individuals) and terrestrial, having a superior operculum, and possessing ellipsoid oogonium and oospore.
- It looks like moss protonema, is *velvety green* but *turns yellowish-green* as it matures.
- **Growing condition** – *Rainy weather* is likely needed for its abundant growth.
- **Applications** – It is in medicine, agriculture, and in the production of a *natural pigment, astaxanthin* that is known for its unique biological activities and health benefits.

> ***Astaxanthin*** *is a red pigment that belongs to a group of chemicals called carotenoids. It is an antioxidant and protect cells from damage. It might also improve the way the immune system functions.*

Algae

• They are *photosynthetic eukaryotic* organisms.
• **Taxonomy** – They belong to the *Protista kingdom*.
• They are a polyphyletic group, having no common ancestor.
• **Habitat** – Predominantly aquatic but can also be found in other environments.
• **Occurrence** – It can be *single cells or can exist in colonies* of different cells.
• **Size** – It varies from microscopic ones such as Chlorella and diatoms to giant kelps with millions of cells.
• **Types** – *Red, green, and brown* algae based on their color.
• **Not true plants** – They *lack true roots, leaves, and stems* but share similarity with the lower plants like liverworts and mosses.
• **Importance** – It play a significant role in ecosystems and have enormous economic importance in the world market, from high-value products to wastewater treatment.

References

1. The Hindu| Discovery of Oedocladium sahyadricum
2. Life Sciences News| Algae

Stellaria mcclintockiae

A new plant species found on the high, muddy slopes of the Nelliyampathy hills.

- **Discovered in** – ***Kerala***.
- **Taxonomy** – It belongs to the ***genus Stellaria***, 1st species of this genus reported from south India.
- **Features** – It is an *annual herb* growing up to 15 cm in height and it *differs from other species of this genus* with respect to its petals, pollen morphology, bracts, sepals, and seed architecture.
- Once it was established as a new species, it was *named after Nobel laureate Barbara McClintock*.

> ***Barbara McClintock*** *won an unshared Nobel Prize in Physiology in 1983 "for her discovery of mobile genetic elements." She proved genetic elements can sometimes change position, that is 'jump' on a chromosome, causing nearby genes to become active or inactive.*
>
> ***Transposable elements (TEs),*** *also known as "jumping genes" or transposons, are sequences of DNA that move (or jump) from one location in the genome to another.*

- **Protection status** – It was recommended by researchers to be classified as critically endangered under the IUCN Red List, as the *number of plants is very few*.
- **Threat** – Its habitat is "prone to severe grazing and stamping of elephants."
- **Challenges in identification** – Species of this genus pose difficulties as the *floral parts are minute* and the delineating traits are hard to pinpoint.

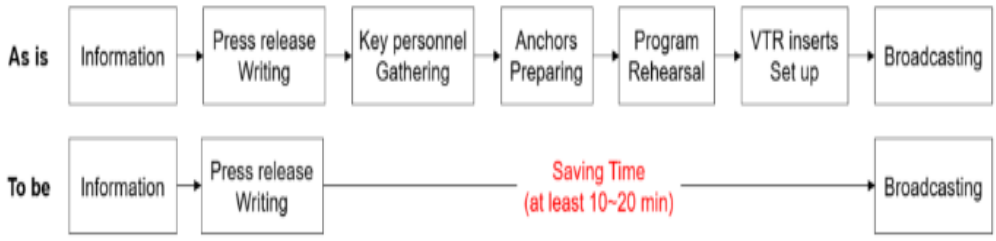
Reference

The Hindu| Discovery of a new plant species 'Stellaria mcclintockiae'

AI Anchors - AI Krish & AI Bhoomi

DD Kisan deploys two Artificial Intelligence (AI) anchors.

- **AI anchors** – Also known as a virtual news anchor.
- **Not a physical robot** – It is a computer-generated representation of a human news anchor existing solely in the digital realm.
- **AI technologies** – It uses *natural language processing*, *speech synthesis*, and *computer vision* to generate realistic and human-like speech and movements.
- **Working** – It involves several stages like
  - **Text Generation** – For the AI anchor to deliver.
  - **Speech Synthesis** – The text is then transformed into lifelike speech.
  - **Facial Animation** – It synchronize expressions with the spoken words.
  - **Video Generation** – The synthesized speech and facial expressions, is compiled into a video format.
- **Advantages** – In the event of an emergency, such as severe weather, an AI Anchor can *quickly deliver new video.*
- The script immediately becomes a news video, *saving at least 10 to 20 minutes* in breaking news time.



- **2 AI anchors of DD Kisan** – ***AI Krish and AI Bhoomi***, and both can speak in *50 Indian and foreign languages*.
- **Availability** – In all the states of India.
- **Role** – It will provide information about agricultural research in India and globally, trends in agriculture mandis, changes in the weather, or any other information of government schemes.

DD Kisan

- It is also known as *Doordarshan Kisan*.
- **Launched in** – 2015.
- **Launched by** – Union *Ministry of Information and Broadcasting*
- **Aim** – To cater to the *farming and rural community* with necessary information related to agriculture.

- **Significance** – It is also working to bring forward the efforts of progressive farmers to all the people and works towards creating an environment of holistic development by educating them.

DD Kisan is strengthening the three-dimensional concept of agriculture which includes balanced farming, animal husbandry and plantation.

References

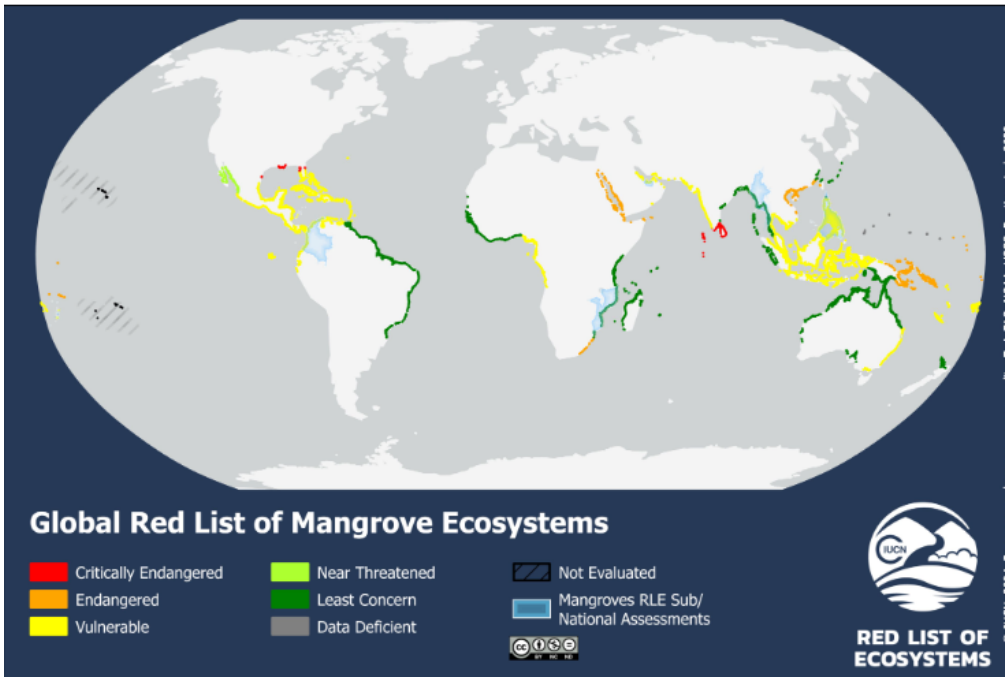
1. The Hindu| The AI Anchors of DD Kisan - AI Krish and AI Bhoomi
2. DeepBrain| AI Anchors

Global Red List of Mangrove Ecosystems

A new study warns that South India's mangrove ecosystems under risk of collapse.

***Mangroves** are tropical trees or shrubs that grow in coastal saline or brackish water where other species cannot survive. They act as a natural barrier to coastal soil erosion and other natural disasters like floods.*

- **Published by** – ***IUCN***
- **Data source** – IUCN's Red List of Ecosystems.
- **Prepared by** – Experts from various research institutions, including the IUCN Species Survival Commission and the Global Mangrove Alliance.
- **Coverage** – World's mangrove ecosystems in 36 different regions.



- **Findings** – The world's mangrove ecosystems cover about *150 thousand sq.km* along

mainly tropical, sub-tropical and some warm temperate coasts of the world.

- About *15% of the world's coastlines* are covered by mangroves.
- 50% of the mangrove ecosystems assessed are at risk of collapse under vulnerable, endangered, or critically endangered category.
- Nearly 20% are at high risk, classed as either endangered or critically endangered
- World's *top 2 mangrove ecosystems* 'Warm Temp North West Atlantic' and 'South India and Sri Lanka, and Maldives' are in the critically endangered category.
- 5 regions in the endangered and 10 in the vulnerable categories.
- **In India** – They are in *high risk of collapse in South India* due to Pollution, deforestation and development activities at the coast.
- However, mangrove ecosystems in *western and eastern India are less susceptible* to risk.

Indian mangrove ecosystems
• It have been bunched into ***3 parts***. - Ecosystems in the Bay of Bengal, shared with Bangladesh. - Ecosystem in the west, shared with Pakistan. - Ecosystem in the South, shared with Sri Lanka and Maldives • **Protection status** - *Least concerned* – Mangrove ecosystems in East and West - *Critically endangered* – Mangrove ecosystem in the south

- **Significance** – This is the *1st global assessment of a full ecosystem functional group* across the planet using the Red List of Ecosystems.
- It is key to track progress towards the goal of halting and reversing biodiversity loss, in line with the Kunming-Montreal Global Biodiversity Framework

References

1. The New Indian Express| South India's Mangrove Ecosystem at risk
2. IUCN| Red List of Mangrove Ecosystem

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Information is Empowering