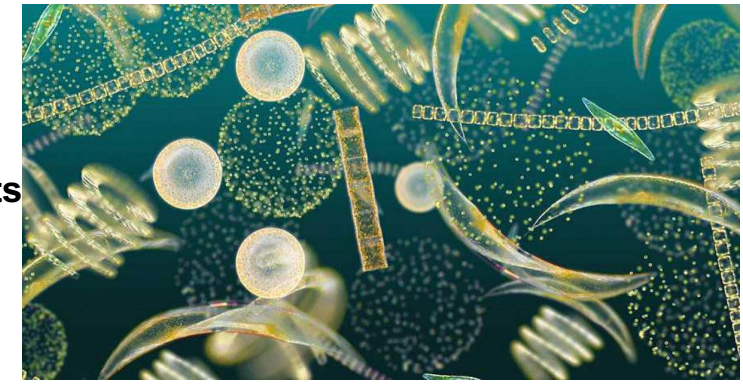
Phytoplankton Biomass in Bay of Bengal

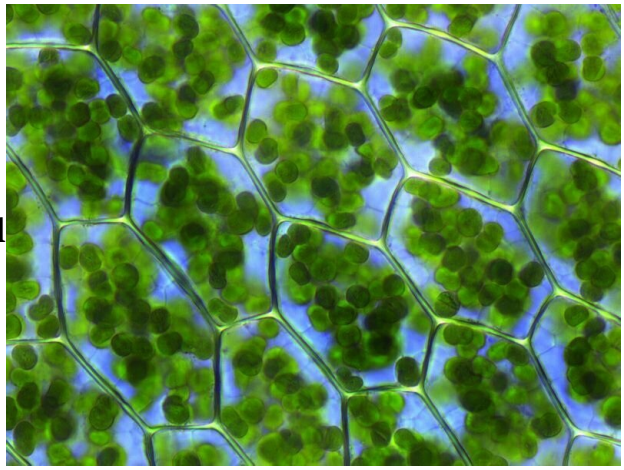
A team of scientists from the **Indian National Centre for Ocean Information Services (INCOIS)** have discovered **a way to measure the quantity of chlorophyll-a** that indicates abundance of **phytoplanktons** in the Bay of Bengal in real-time.

Key Points



- **Phytoplanktons:** They are tiny microscopic floating plants found in water bodies.
  - Study of phytoplankton biomass is done by analyzing **chlorophyll-a,** a dominant pigment found in phytoplankton cells.
  - **Significance of Phytoplanktons:**
    - They contribute more than half of the **oxygen** in the environment.
    - They **reduce global warming** by absorbing human-induced carbon dioxide.
    - They also serve as the base of the **ocean food chain.**
    - They are important **bioindicators** regulating life in oceans. Their abundance determines the overall health of the ocean ecosystem.

- **Study:** The scientists closely tracked **the long-term trends of chlorophyll-a in the northwestern Bay of Bengal.**
    - It was based on **in-situ and satellite data** spanning over the last 16 years, from January 2003 to December 2018.
    - **National Aeronautics and Space Administration (NASA)'s MODIS (Moderate Resolution Imaging Spectroradiometer), NASA's VIIRS (Visible Infrared Imaging Radiometer Suite) sensor** and **Indian Space Research Organisation (ISRO)'s OCM-2 (Ocean Colour Monitor-2)** were used for satellite data.
- **Findings:** There were **two peaks of chlorophyll-a —** the primary peak occurred during the **pre-southwest monsoon** due to the recurrent phytoplankton bloom in the coastal water and the secondary peak occurred during the **end of the southwest monsoon,** spreading to far offshore areas.
- **Reasons:** Along with **increase in phytoplanktons,** other reasons for peak in chlorophyll-a may be **physical forces** such as upwelling, wind-induced vertical mixing, convective overturn and **chemicals** from various sources including river runoff.
- **Conclusions:**
    - **Increased Nutrients and More Phytoplanktons:** It reveals that the study area experienced **maximum spatial variability during pre-southwest monsoon with salinity, and nutrients,** the major controlling factors for the abundance and distribution of phytoplankton.
    - **Chances of Eutrophication:** Increase in nutrients could tell an overall improved health status of the ecosystems as a whole; at the same time excessive phytoplanktons could be detrimental to ocean health because of eutrophication.
        - **Eutrophication:** When a water body becomes overly enriched with minerals and nutrients which induce excessive growth of algae or **algal bloom.**
        - This process also results in oxygen depletion of the water body affecting other aquatic animals.

Chlorophyll 

- Chlorophyll is the major pigment used by plants for **photosynthesis,** the process by which **light energy is converted to chemical energy** through the synthesis of organic compounds.
- The word chlorophyll comes from two Greek words; Chloros which means green and phyllon which means leaf.
- There are **four types** of chlorophyll:
    - **Chlorophyll a,** found in all **higher plants, algae and cyanobacteria.**
    - **Chlorophyll b,** found in **higher plants** and **green algae.**
    - **Chlorophyll c,** found in **diatoms, dinoflagellates and brown algae;** and
    - **Chlorophyll d,** found only in **red algae.**

Way Forward

- This kind of information on marine environmental parameters is now becoming increasingly important as they serve as a basis for monitoring climate change, river discharge, and the impact of **pollution in the ocean.**
- The phytoplankton is largely dependent on **light, temperature and nutrients.** It is therefore, continuous monitoring of the ocean ecosystem is the need of the hour to devise **mitigation systems to encounter disruption caused by algal bloom** because of excessive phytoplankton enrichment in the coastal water.

Source: DTE