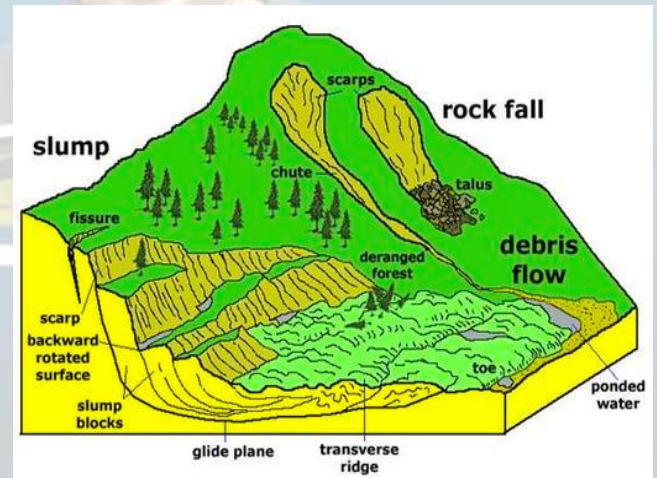
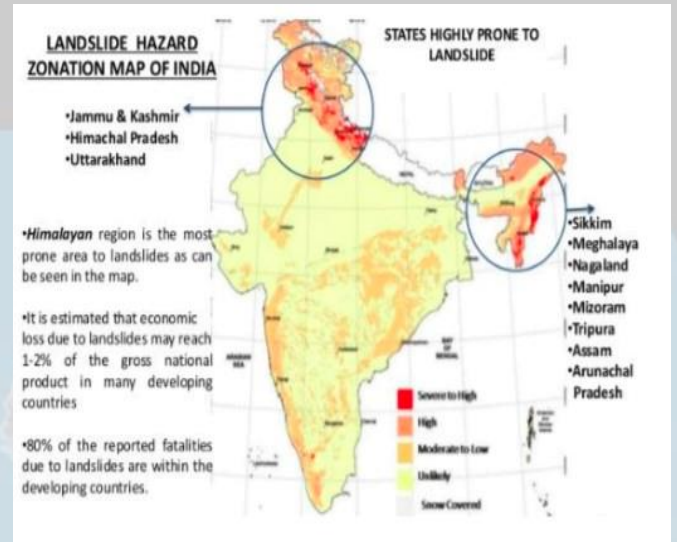
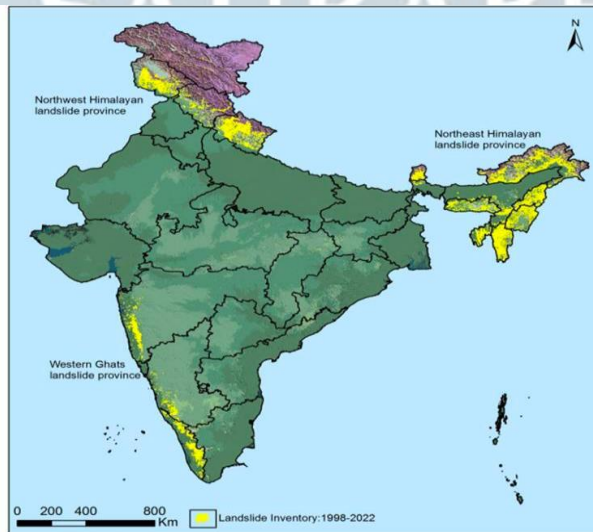


## Landslide and technology

- Landslides are a unique and deadly problem. They are less widespread and harder to track and study with satellites.
- Landslides happen in localised areas and affect only about 12% of the country.
- As a result, there is much less data of sufficient quality for typical machine learning models to work with
- Researchers prepared two elements for analysis: 150,000 data points for known landslide events and 16 factors that rendered an area susceptible to landslides.



- Information about these factors was collected for the whole country
- Machine learning models were used to make projections for all areas for which there wasn't any landslide data.
- That is, even if a landslide had not occurred at a particular place, the ensemble could estimate its susceptibility to one

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- After all the analyses, and with the help of GSI's (geographical survey of India) extensive collection of landslide data, they developed a high-resolution landslide susceptibility map.
- The map acknowledged some well known regions of high landslide susceptibility, like parts of the foothills of the Himalaya, the Assam Meghalaya region, and the Western Ghats.

### • The Hindu

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#### **Panspermia**

- The question of how life began has invited numerous hypotheses. One that has prevailed since ancient Greece is panspermia.
- It was first posited by the Greek philosopher Anaxagoras (500-428 BC), who coined the term and first articulated life's potential to travel as 'seeds' between planets.
- While this concept found echoes in the thoughts of other philosophers of his time,
- Some of the more important studies demonstrated that microorganisms could endure the extreme conditions that come with being ejected from a planet, navigating the rigours of interplanetary travel, and

withstanding the impact of reaching a new world.

- Nineteenth century researchers, including Swedish scientist Svante Arrhenius, also contributed to this discourse by suggesting mechanisms like radiation pressure from the Sun that microorganisms could be propelled by through space.
- In its modern version, the idea of panspermia advances three stages: escape from a planet, transit through interplanetary space, and landing on another planet.

- But because panspermia simply attributes the origin of life on one planet to a different planet, it doesn't actually explain how life came to be.

### The Hindu

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#### **Rise of child marriage**

- The Lancet paper titled 'Prevalence of girl and boy child marriage across States and Union Territories in India, 1993–2021: a repeated cross sectional study' highlights that one in five girls are still married below legal age in India.
- "The largest absolute increase in headcount was observed in West Bengal, representing an increase of 32.3% in headcount (difference n=500346 )...

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- West Bengal saw the largest absolute increase with over 5,00,000 more girls getting married as children,” the paper said.
- Researchers like Mr. Ahamed point out that surprisingly there is no direct correlation between literacy rate and child marriage.
- Despite high literacy, the incidence of child marriage is also disproportionately high in some districts.
- Indians have been found to be particularly vulnerable to scams of this nature.
- According to McAfee, 66% of Indian participants admitted that they would respond to a voice call or a phone call that appeared to be from a friend or family member in urgent need of money, especially if the caller was supposedly a parent (46%), spouse (34%) or their child (12%).

### The Hindu

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#### Voice cloning



- voice cloning through Artificial Intelligence (AI) was just a phenomenon of mild amusement.
- AI generated songs by famous artistes like Drake and Ariana Grande were floating around online.
- However, fears around the AI software were realised when AI voice cloning related scams burgeoned.

### The Hindu

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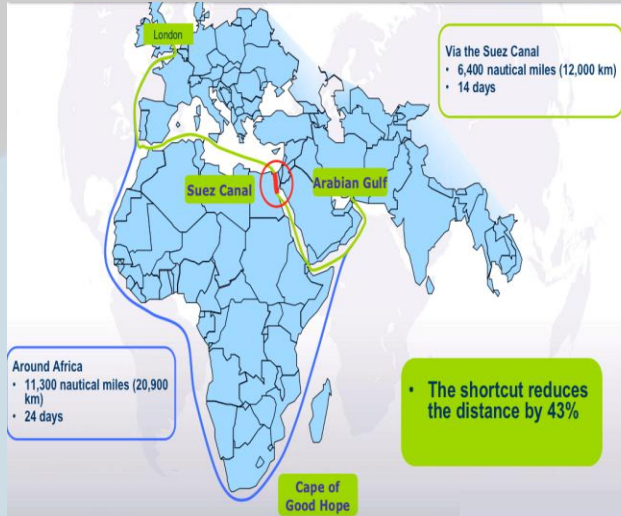
#### Red sea and trade

#### What is the impact on Indian trade flowing through the Red Sea?

- After the attacks, major cargo shipping lines decided they would not operate on this route.
- Even small feeder vessels have of late stopped plying in these waters.
- Almost 90% of western hemisphere cargo, both inbound or shipped from India, that used to go through the Red Sea is now getting rerouted through the Cape of Good Hope,
- Whether exporting to Europe, the U.S. east coast and even to countries in North Africa, the longer route is being used.



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- The remaining 10% of Indian import or export cargo is either not moving or using a transit facility.

- The impact of this move varies on the type of buyer seller contract.

- If it is FOB (free on board), the freight burden is on the buyer, and in CIF (cost, insurance and freight) or C&F (cost and freight) contracts, the freight has to be borne by the exporter.

- In cases of FOB, and where the buyers have comfortable inventory, they are asking the Indian exporter to hold back consignment.

- Likewise, exporters who have to bear the freight are requesting their buyers to allow them to hold the consignment given the increase in freight costs, which includes peak season surcharge and contingency surcharge.

- However, if there is zero inventory, the buyer would insist on shipment of the goods,

- Container Corporation of India is saying about 25% of its containers are being held back by Indian exporters. i.

- While all consignments are likely to be impacted by the increase in freight cost by up to sixfold in some cases



### How does the crisis impact India's imports?

- Besides the extra time taken on account of the longer route, the developments could make imports costlier and call for better inventory management.
- the Red Sea crisis could come in the way of any plans to reduce pump prices of petrol and diesel.
- Additional war risk premiums in the Red Sea have been partially contributing to the freight rate increases for the relevant routes, but this surcharge is significantly lower than the costs linked to rerouting via the Cape of Good Hope.

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### Photosynthesis

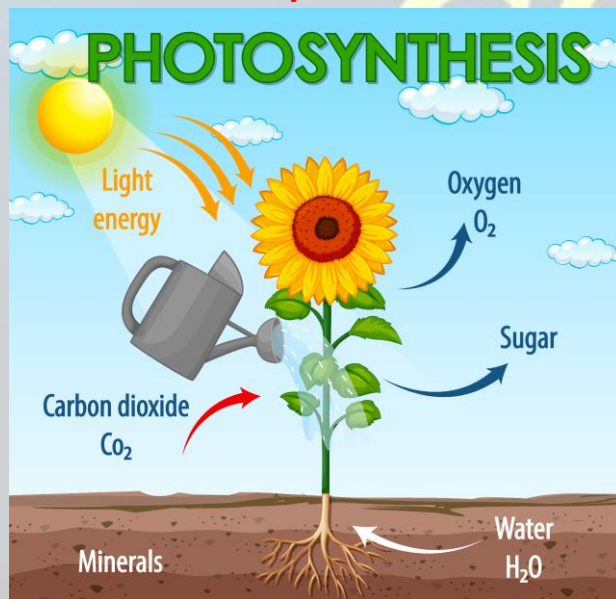
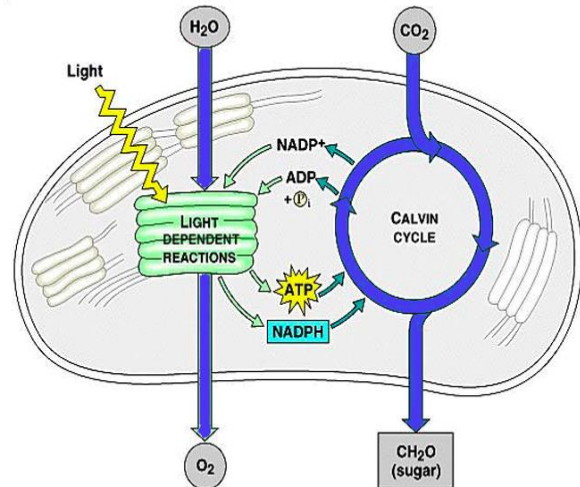


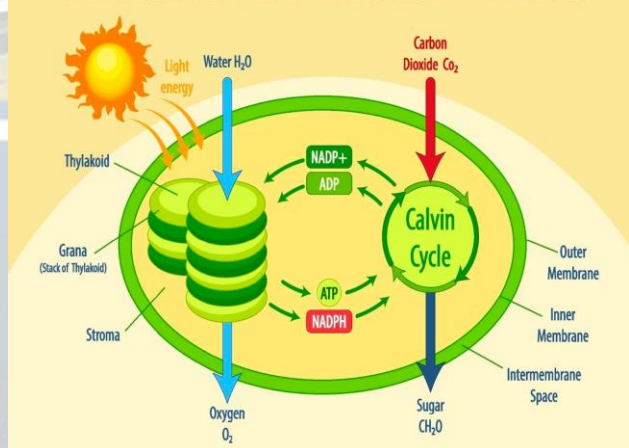
Figure 10.4 An overview of photosynthesis



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### PROCESS OF PHOTOSYNTHESIS



- The oldest evidence of photosynthetic structures reported to date has been identified inside a collection of 1.75 billion year old microfossils, a paper published in the journal Nature reveals.
- The discovery helps to shed light on the evolution of oxygenic photosynthesis.



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- Oxygenic photosynthesis, in which sunlight catalyses the conversion of water and carbon dioxide into glucose and oxygen, is unique to cyanobacteria and related organelles within eukaryotes.
- Cyanobacteria had an important role in the evolution of early life and were active during the Great Oxidation
- **What is a great Oxidation event??**
- The accumulated oxygen started escaping into the atmosphere, where it reacted with methane. As more oxygen escaped, methane was eventually displaced, and oxygen became a major component of the atmosphere.
- This event, known as the “Great Oxidation Event,” occurred sometime between 2.4 – 2.1 billion years ago direct evidence of fossilised photosynthetic structures from *Navifusa majensis*.
- The microstructures are thylakoids; membrane bound structures found inside the chloroplasts of plants and some modern cyanobacteria.
- *N. majensis* is presumed to be a cyanobacterium.
- The discovery of thylakoids in a specimen of this age suggests that photosynthesis may have evolved at some point before 1.75 billion years ago.
- It does not, however, solve the mystery of whether photosynthesis evolved before or after the Great Oxidation Event.
- Thylakoids represent direct ultrastructural evidence for oxygenic photosynthesis metabolism.
- Thylakoid membranes are dense, mostly galactolipid, protein containing bilayers in which photosynthesis occurs in photosynthetic organisms. “
- The Hindu

### Environmental enteric dysfunction (EED)

- Scientists have discovered promising treatment strategies for a gut condition that commonly afflicts malnourished children in developing countries, according to a new study involving mice and data from 115 children in Zambia.
- By identifying key signatures of environmental enteric dysfunction (EED), their study suggests that a high



protein diet, supplementation of a coenzyme, or a bile acid sequestrant (or a combination thereof) could reverse the disorder's damaging effects on the intestines.

- **Environmental enteric dysfunction (EED)** refers to an incompletely defined syndrome of inflammation, reduced absorptive capacity, and reduced barrier function in the small intestine. It is widespread among children and adults in low- and middle-income countries.

### The Hindu

#### MRI-CONTRAST AGENT

- A team of researchers has designed a 'living contrast' agent for MRI of the brain, allowing them to detect episodes of mild traumatic brain injury more effectively in a large animal model.
- Their imaging agent is based on micro patches that capture immune cells that tend to infiltrate the brain after traumatic brain injury and could provide a powerful diagnostic tool for clinical monitoring and therapeutic research.
- Nearly 6090% of mild traumatic brain injury cases currently go undiagnosed.

- What are contrast agents?

- Air and carbon dioxide gas are common examples of negative contrast agents used in radiology.
- These agents are often used to visualize specific areas, such as the gastrointestinal tract, where the simple presence of gas can provide valuable diagnostic information.

#### Liver contrast agents

- ◆ Gadobenate dimeglumine (MultiHance, Bracco)
- ◆ Small iron particles- Endorem & Resovist
- ◆ Manganese –containing contrast agents- Teslascan – absorbed by liver, pancreas and cortex of kidneys, T1 relaxation



### The Hindu

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### Long-lived plasma cells (LLPCs)

- By examining the effects of a SARS-CoV2 vaccine in large animals, scientists have developed a pipeline to isolate and study long lived plasma cells that produce antibodies.
- Their technique provides a means to detect these rare cells and could inform studies of the immune system.
- Long-lived plasma cells originate in germinal centres and usually take up residence in the bone marrow.
- There, they secrete antibodies and help protect against pathogens over long periods.

### • Long-lived plasma cells (LLPCs)??

- Long-lived plasma cells (LLPCs) are a distinct subset of [plasma cells](#) that play a crucial role in maintaining humoral memory and long-term immunity.
- Plasma cells, also called plasma B cells or effector B cells, are [white blood cells](#) that originate in the [lymphoid organs](#) as [B cells](#) and secrete large quantities of proteins called [antibodies](#) in response to being presented specific substances called [antigens](#).
- They continuously produce and secrete high-affinity [antibodies](#) into

the bloodstream, conversely to memory B cells, which are quiescent and respond quickly to [antigens](#) upon recall

- long-lived plasma cells fulfill the criteria of [memory cells](#) as they continuously secrete the antibodies independently of their precursor cells (B cells), T cell help and antigen presence.

### • The Hindu

- L. saxatilis
- The seaside marine snail *Littorina saxatilis* is the most misidentified creature in the world.

- Although live bearing is the only trait that distinguishes *L. saxatilis* from its egg-laying relatives, *L. saxatilis* did not seem to form a single evolutionary group.

- “We were able to identify 50 genomic regions that together seem to determine whether individuals lay eggs or give birth to live young,”

- *Littorina saxatilis* is commonly known as the Rough Periwinkle.

- It is native to the North Atlantic with a range spanning from the Arctic Ocean to Virginia (in the West Atlantic) and the Iberian Peninsula (in the East Atlantic)





- **The Hindu**

### Dietary diversity

- reduction in “dietary diversity” influences the quality of our diets. Eating food from many different food groups improves nutrition.
- But the practice of monoculture – growing one crop or vegetable on large tracts of land – only reduces “agricultural biodiversity”.
- One alternative, to transport food groups from distant regions, raises costs and carries a heavy environmental penalty.
- Wide variety Farmers with small holdings, Shepherds on pastoral lands and tribal populations that practice agroforestry are major contributors to nutritional variety in our country
- The indigenous people of Northeast India practiced a form of agriculture,

called Jhum, in which about 20 different food crops would be grown on the same piece of land.

- This form of cultivation is a total antithesis of modern agricultural practices but offers plenty of diversity in their diets. Sadly, this form of cultivation is losing ground.

**The Hindu**