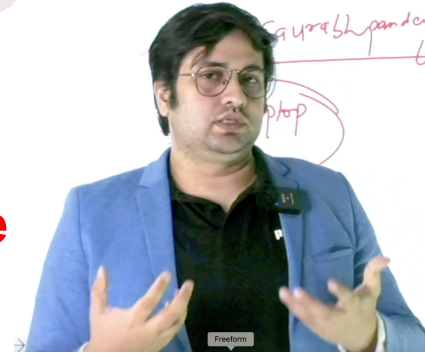


# Topics - MINDS MAPS included



- (thromboinflammation)
- Planetary Protection in Space Missions
- Soyuz MS-26 Mission
- Prime Minister Modi's Visit to Brunei and Singapore
- Cyclogenesis in the North Indian Ocean
- Impact of Arctic Sea Ice Changes on Indian Monsoon
- Mains



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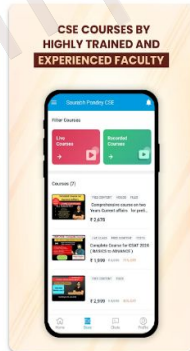
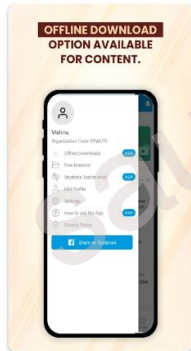
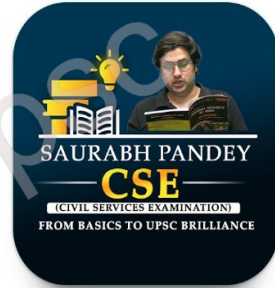
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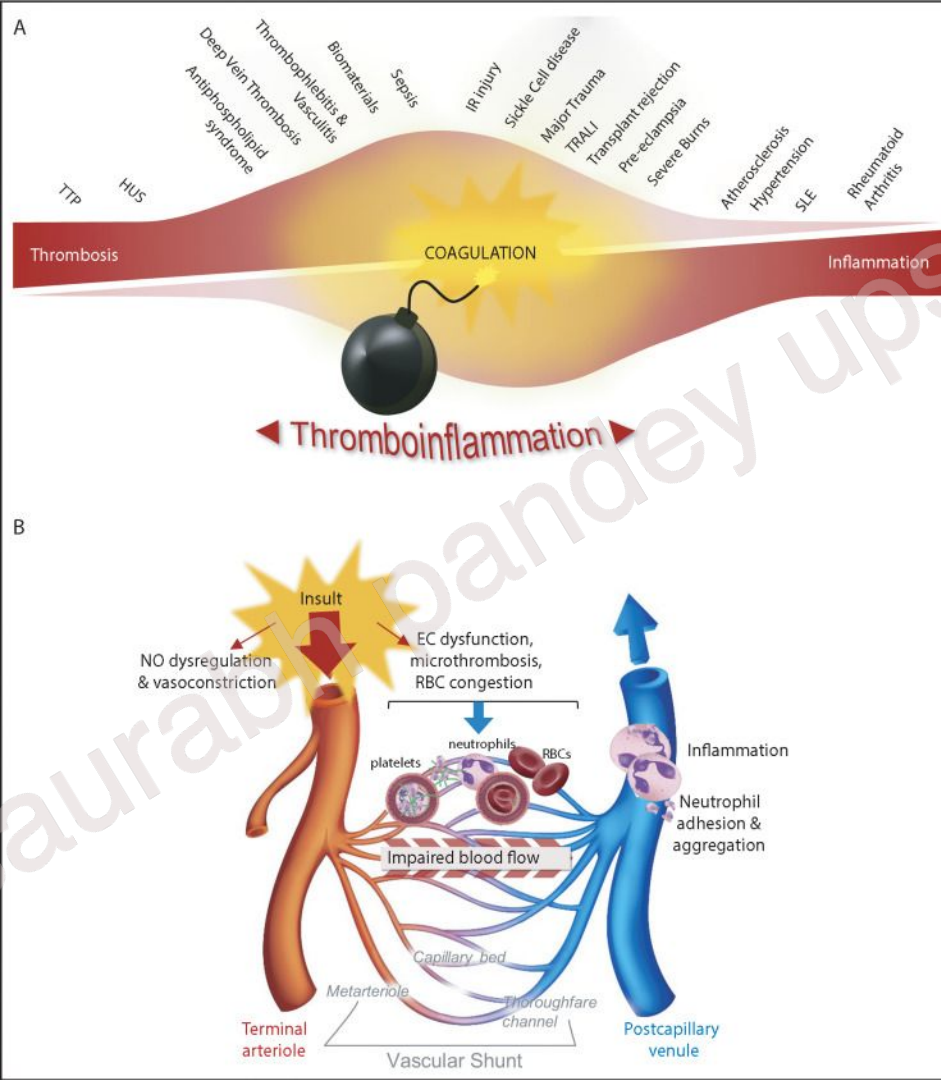
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## **Topic- (thromboinflammation)**

- **Thrombo-inflammation causes the symptoms of post-acute sequelae of long COVID.**
- **This condition continues to affect millions worldwide even after high population immunity and significantly lower incidence of severe COVID-19**
- **Researchers have found that long COVID complications aren't correlated with the severity of initial COVID-19.**
- **A person can have these complications after mild or even asymptomatic COVID-19 infection**





- **Thrombosis with associated inflammation (thromboinflammation) occurs commonly in a broad range of human disorders.**
- **It is well recognized clinically in the context of superficial thrombophlebitis (thrombosis and inflammation of superficial veins); however, it is more dangerous when it develops in the microvasculature of injured tissues and organs .**

- **The study demonstrated a therapeutic strategy to manage COVID.**
- **A derivative of the 5B8 antibody has entered phase I clinical trials.**
- **If it completes this phase, it is likely to enter phase 2 where researchers will assess clinical endpoints**

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## ----->> What is Monoclonal antibodies ?

**Monoclonal antibodies are lab-made molecules that mimic the immune system's ability to fight off harmful pathogens.**

### **Applications:**

**Treatment for various diseases (e.g., cancer, autoimmune diseases)**

**COVID-19 therapies**

**Vaccines enhancement**

# Topic-> Planetary Protection in Space Missions



## Overview

- **Planetary Protection:** A principle to preserve the Earth and other celestial bodies' biospheres from contamination by extraterrestrial life 🌌.
- **Importance:** Ensures that interplanetary missions (like those to the Moon or Mars) do not corrupt pristine environments 🛡️.
- **Legal Basis:** Defined in Article IX of the Outer Space Treaty (1967), mandating avoidance of harmful contamination.

# Key Aspects



## Contamination Risks:

**Microbial Life:** Potential for "alien" microbes to affect ecosystems on Earth or other planets 🌍.

**Environmental Changes:** Adverse changes due to extraterrestrial matter introduction.

## Current Missions:

**Tianwen-3:** China's Mars sample-return mission slated for 2028, adhering to planetary protection principles 🚀.

## Cleaning Protocols:

**Spacecraft Cleaning:** Full assembly of spacecraft followed by baking in a dry room at 120°C for three days to eliminate microbes 🔬.

**Updating guidelines to adapt to new discoveries in astrobiology and planetary science** 📜.

# Challenges



## Technical Demands:

Increased costs and technical complexity due to stringent cleaning requirements 💰.

## Balancing Exploration and Protection:

Need for exploration while ensuring environmental integrity.

## Future Directions

### Research and Development:

Ongoing studies on effective methods for planetary protection in future missions 🔍.

### Policy Development:

## Topic- Soyuz MS-26 Mission

### Overview

**Soyuz MS-26:** A significant mission to the International Space Station (ISS).

**Main Objectives:** Transport astronauts, supply missions, and support ISS operations.

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# Key Components



## Launch Details

**Date: TBD**

**Vehicle: Soyuz 2.1a**

**Launch Site: Baikonur Cosmodrome**

## Crew Members

**Notable Members:**

**NASA's oldest active astronaut Don Pettit**

**Tracy C. Dyson**

## Mission Duration

**Approx. 6 months on the ISS**

## Mission Tasks

### Transportation

**Astronauts from various countries (Russia, Belarus, NASA)**

### Research Activities

**Experiments in microgravity**

**Collaborations with international partners**

### Resupply

**Transporting supplies and equipment to ISS**

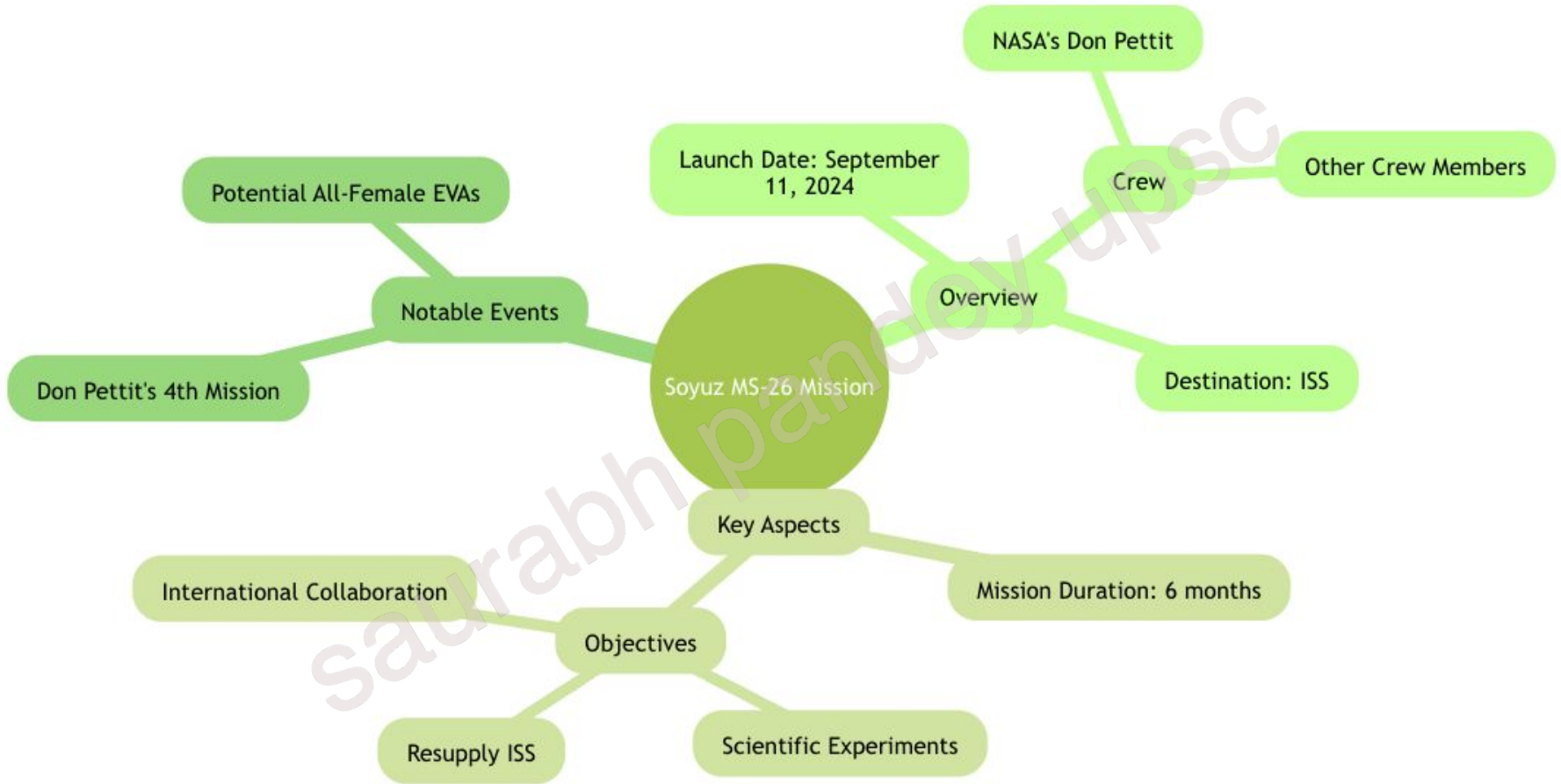
**Supporting ongoing experiments and living conditions**

### Related Missions

**Soyuz MS-25: Preceding mission that set the stage for MS-26.**

**Progress MS-26: Resupply mission that supports ISS operations**





# TOPIC -Prime Minister Modi's Visit to Brunei and Singapore



## Overview

**Purpose:** Strengthening India's Act East policy

**Focus:** Reconnecting with ASEAN countries

**Significance:** First bilateral visit by an Indian Prime Minister to Brunei

# Key Points



## Modi's Itinerary:

**Visits to Brunei and Singapore**

**Future travels to Laos, Philippines, and Indonesia**

## Regional Engagement:

**Invitation to Prime Ministers of Vietnam and Malaysia**

**Emphasis on strengthening ties with Southeast Asia**

## Trade Dynamics:

**Decline in trade with Brunei, rising oil imports from Russia**

**Doubling of trade with ASEAN over the last decade**

## **Strategic Discussions:**

**Geo-strategic issues and defense cooperation**

**Renewed space cooperation involving ISRO in Brunei**

## **Technological Collaboration:**

**Focus on semiconductors in Singapore**

**Importance of rare earths and chip manufacturing**

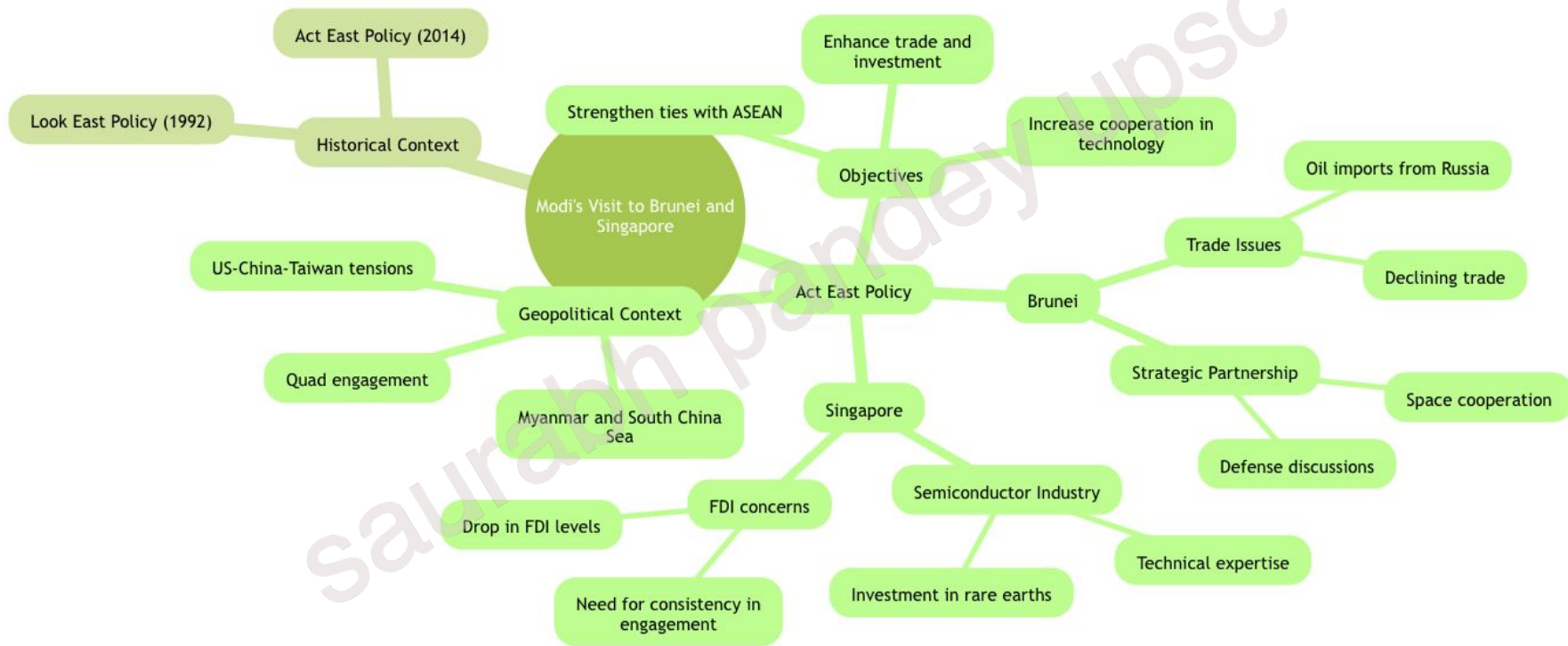
**Addressing U.S.-China-Taiwan tensions**

## **Historical Context:**

**Modern ties need periodic resets**

**Comparison with previous policies: Look East (1992) and Act East (2014)**

figures 1.1: mindmap



# Topic--->> Cyclogenesis in the North Indian Ocean

## Overview of Cyclogenesis

### Moisture Supply

Large evaporation from Arabian Sea & Bay of Bengal

Contributes to summer monsoon (200 lakh crore buckets)

### Cyclone Activity

Warm tropical oceans = hotbeds for cyclones

North Indian Ocean = least active region for cyclones

### Unique Characteristics

Factors that favor and suppress cyclogenesis

Response to global warming



## ## Reasons for Uniqueness

### Monsoonal Circulation

Dramatic seasonal wind reversals

Influence on cyclone formation

### Oceanic Tunnels

Connection to Pacific and Southern Oceans

Warm water from Pacific & cooler waters from Southern Ocean

### Temperature Dynamics

Rapid warming of Arabian Sea during pre-monsoon

Bay of Bengal's temperature influences atmospheric convection

## ## Seasonal Patterns

### Pre-Monsoon Season

Arabian Sea warms rapidly

Initiates evaporation and moisture buildup

### Monsoon Onset

Trough leads to monsoon onset over Kerala (mid-May)

### Post-Monsoon Season

Northeast monsoon season

Significant rainfall over multiple states

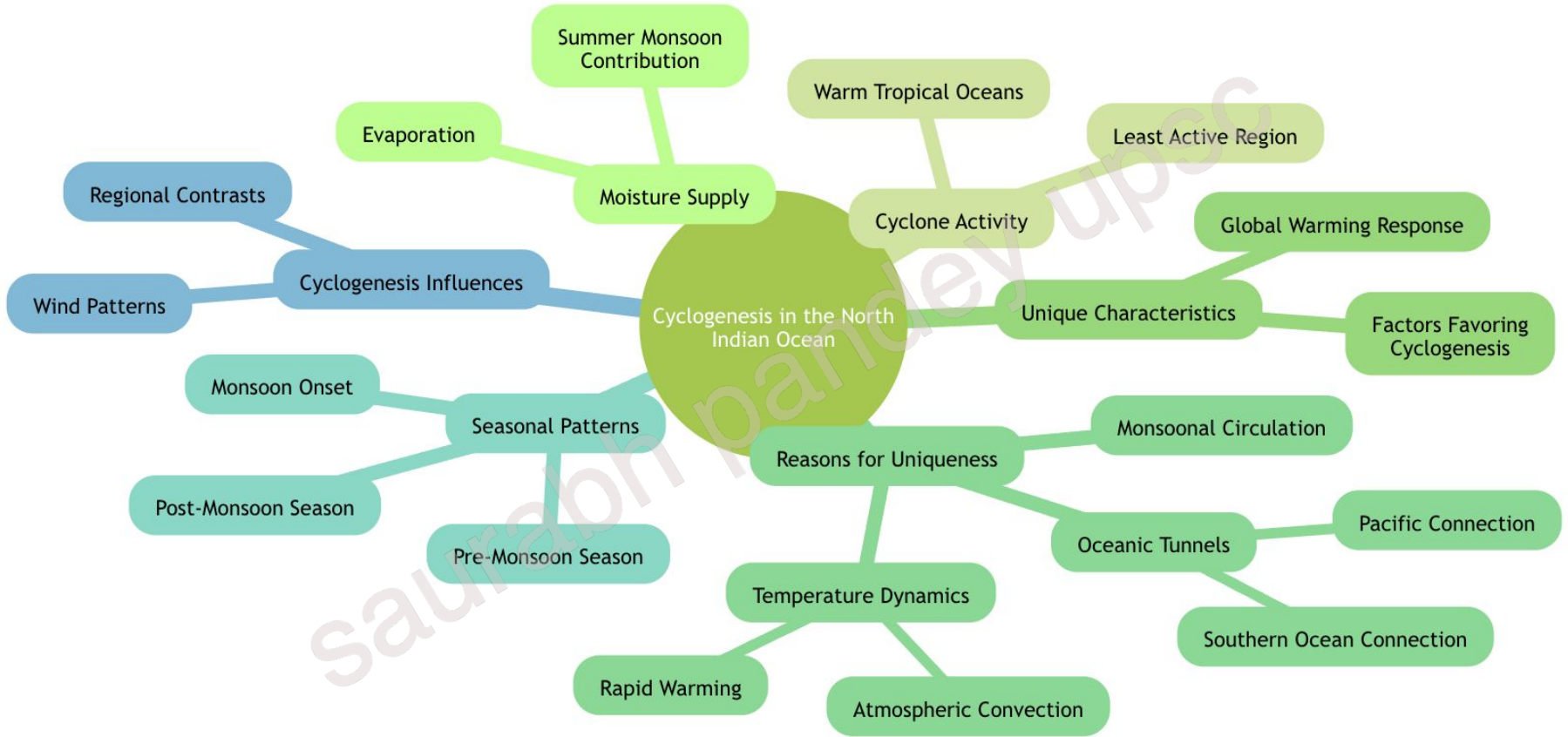
## ## Cyclogenesis Influences

### Wind Patterns

Sea surface temperatures affecting cyclogenesis year-round

### Contrasts Between Regions

Differences in cyclone activity between Arabian Sea and Bay of Bengal



# ----->>Climate Change Impact on the Indian Ocean

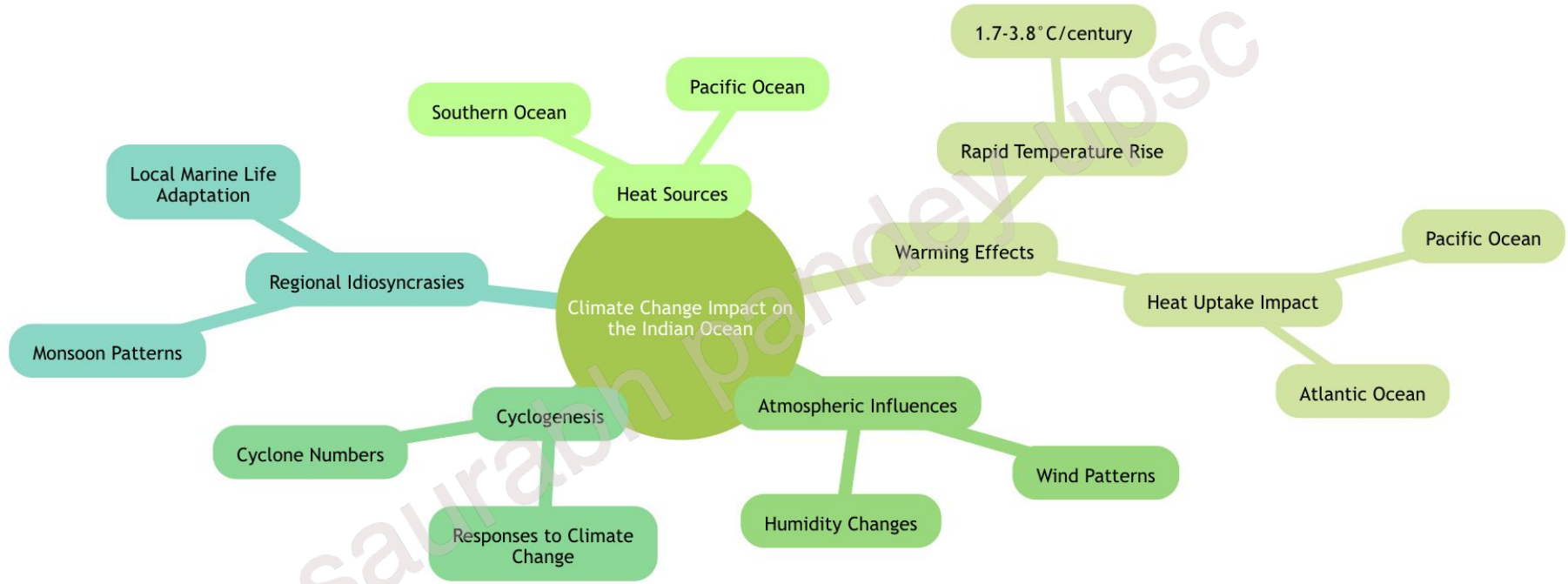


## Overview

**Climate change is significantly affecting the Indian Ocean.  
Increased heat influx from the Pacific and Southern Oceans.  
Rapid warming due to atmospheric changes.**

## Key Points:

**Heat Influx: Warmer waters from the Pacific and Southern Oceans.  
Atmospheric Changes: Winds and humidity alterations.  
North Indian Ocean: Response to climate drivers from tropical and pole-to-pole influences.**



# ---->>>Cyclones in the Arabian Sea: Are They Common?

## Overview of Cyclones in the Arabian Sea

**Cyclone Formation:** Influenced by monsoonal circulation and atmospheric conditions.

**Seasons:** Dominated during pre- and post-monsoon periods.

**Comparative Frequency:** Less common in the Arabian Sea compared to the Bay of Bengal.

## Key Factors Affecting Cyclone Formation

**Vertical Shear:** Variation in wind strength and direction reduces cyclone energy.

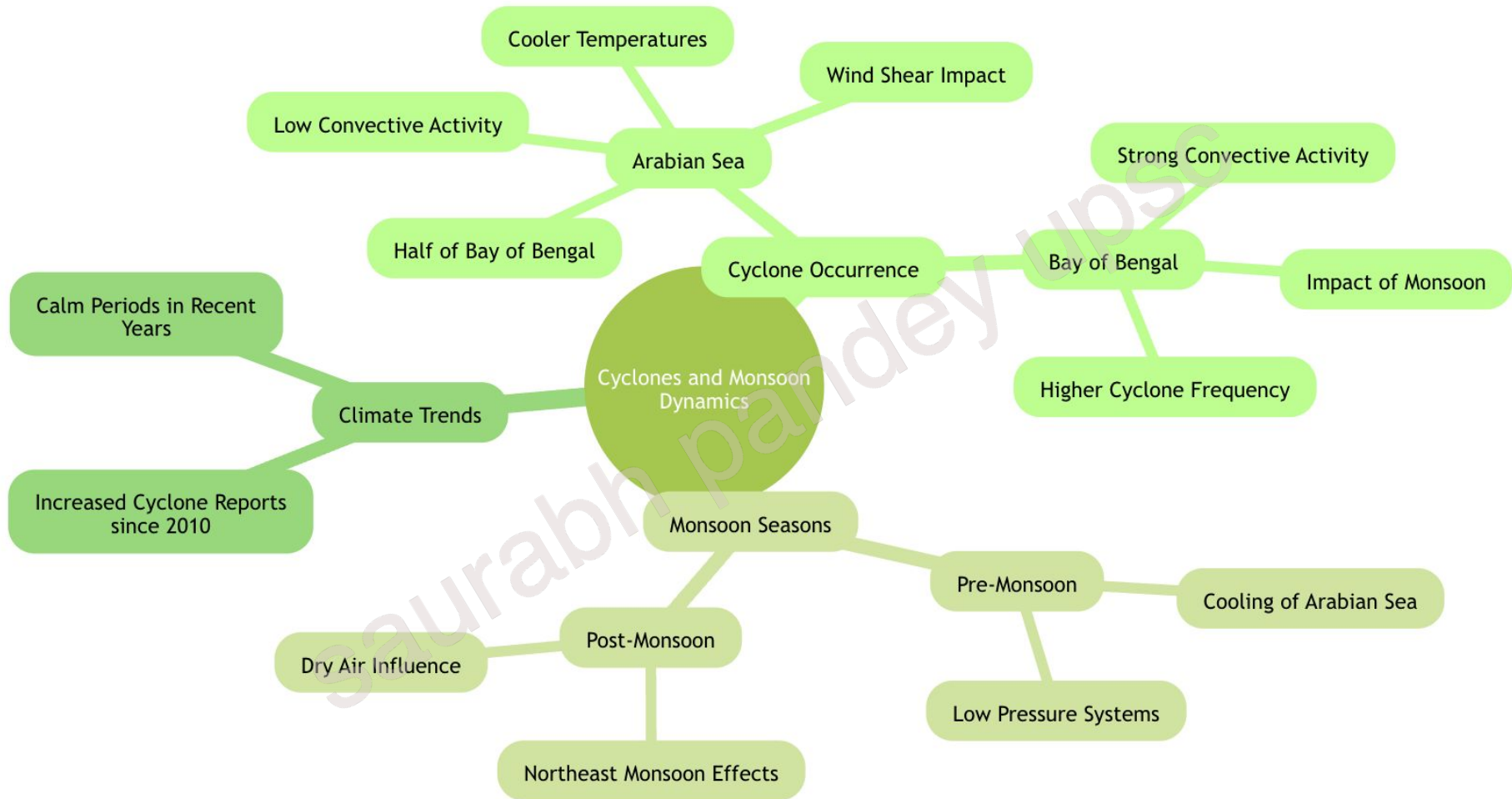
**Temperature:** Cooler surface waters during pre-monsoon limit cyclogenesis.

**Convective Activity:** Lower in the Arabian Sea compared to the Bay of Bengal.

## Impacts of Cyclones

**Land Impact:** Bay of Bengal experiences more frequent cyclones.

**Trends:** Some increase in cyclone occurrences since 2010, but recent calm years observed.



# ----->>> What is Asna?

## Overview of Cyclone Asna

**Rare Occurrence:** First cyclone in the north Indian Ocean in August since 1981 

**Origin:** Transition from land-born depression to Arabian Sea 

**Impact:** Caused heavy rainfall and damages, affecting crops and properties 

### Key Points:

#### Cyclone Characteristics:

- Unusual growth over land

- Low-pressure systems normally originate over the Bay of Bengal

#### Historical Context:

- Contributed to extreme rainfall events

- Evidence of a shift in low-pressure system patterns



## Mechanism of Development

**Energy Source:** Warm Arabian Sea feeds energy for convection 🔥

**Soil Moisture:** Low-pressure system utilizes prior rainfall as soil moisture ☁️

**Cycles of Rain:** Enters the ocean, grows into a regular cyclone 🌀

## Effects and Consequences

**Casualties:** Nearly 50 deaths reported 🪦

**Destruction:** Extensive damage to crops and infrastructure 🚧

**Dissipation:** Eventually weakened due to dry desert air intrusion 🌵

## Meteorological Insights

**Warming Trends:** Increasing temperatures of the Arabian Sea linked to cyclone activity



**Jet Stream Influence:** Northward shift of the low-level jet due to rapid warming in West

Asia 🌏

# Topic ---> Impact of Arctic Sea Ice Changes on Indian Monsoon



## Overview

- The *Arctic sea ice* plays a crucial role in influencing weather patterns globally.
- Changes in its level can significantly affect the *Indian monsoon*.

## Key Factors

Arctic Sea Ice 

Melting ic

Temperature change

Impact on atmospheric circulation

## **Monsoon Patterns**

**Rainfall distribution**

**Seasonal shifts**

**Intensity of rainfall**

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# Relationship Dynamics

## Mechanisms of Influence

Altered wind patterns

Changes in moisture transport

Influence on regional climate systems

## Climate Models

Predictions of monsoon variability


Impact assessments of ice melt on rainfall

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# Implications

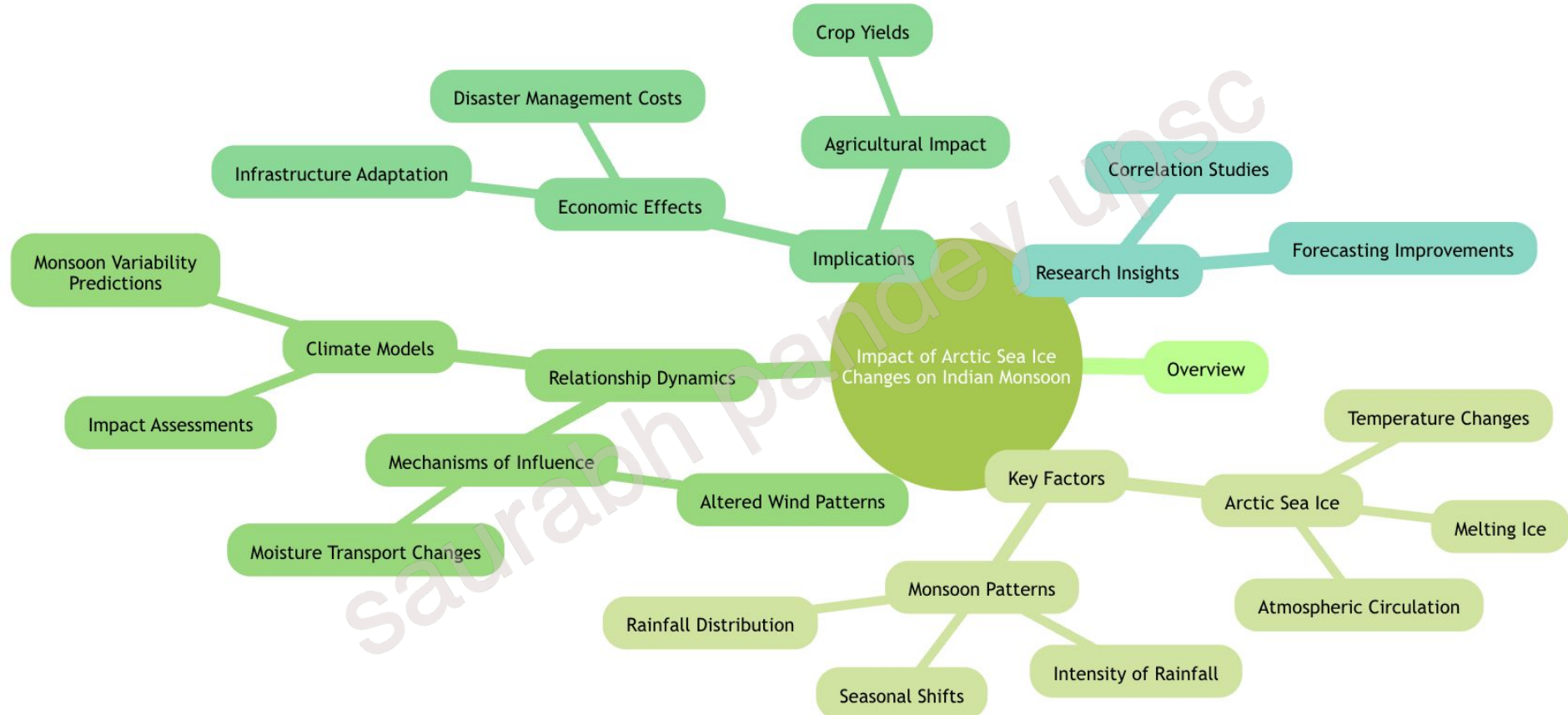


## Agricultural Impact

- Crop yields
- Food security concerns
- **Economic Effects** 
  - Infrastructure adaptation
  - Disaster management costs

## Research Insights

- Studies indicate a direct correlation between *Arctic ice melt* and *Indian monsoon intensity*.
- Ongoing research aims to improve forecasting methods.





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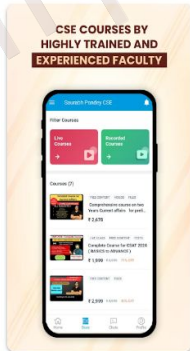
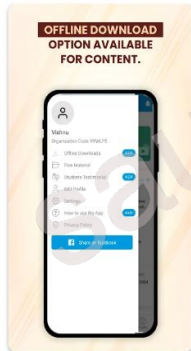
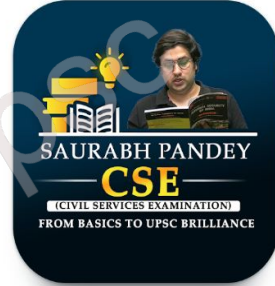
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