



## **DAILY CURRENT AFFAIRS 19-10-2024**

### **GS-2**

1. PM GatiShakti scheme

### **GS-3**

2. Precision medicine
3. Haber-Bosch process
4. Dragon Drone
5. Wayanad Wildlife Sanctuary

## **PM GatiShakti scheme**

**Syllabus: GS-2; Government policies and Interventions, GS-3; Infrastructure Development**

### **Context**

- Recently the PM praised the successful completion of 3 years of PM GatiShakti National Master Plan, calling it a transformative step in India's infrastructure growth.

### **About**

- The **PM GatiShakti Scheme** is a significant initiative by the Government of India aimed at enhancing the country's infrastructure and logistics capabilities.
- Launched on **October 13, 2021**, by Prime Minister Narendra Modi, the scheme seeks to ensure holistic and integrated planning for infrastructure projects across various sectors.

### **Key Features of the PM GatiShakti Scheme:**

- **Objective:**
  - To create a robust and integrated infrastructure framework to boost economic growth and enhance productivity.
  - To reduce logistics costs and improve the efficiency of supply chains.
- **National Master Plan:**
  - The scheme focuses on a **National Master Plan** that lays out a comprehensive approach to infrastructure development.
  - It integrates various infrastructure projects, including roads, railways, ports, airports, and energy, ensuring that different sectors complement each other.
- **Data-Driven Decision Making:**
  - The plan utilizes **Geographic Information System (GIS)** and other technologies to map existing infrastructure and identify gaps.
  - It promotes data sharing among different ministries and departments to facilitate better coordination and efficiency.
- **Stakeholder Involvement:**
  - The scheme encourages participation from various stakeholders, including state governments, industry, and other partners, fostering a collaborative approach to infrastructure development.
- **Focus on Connectivity:**
  - PM GatiShakti aims to improve connectivity across urban and rural areas, ensuring that the benefits of development reach every corner of the country.

- Special attention is given to the development of industrial corridors, multimodal logistics parks, and other facilities.
- **Funding and Support:**
  - The government has allocated funds and incentives to support projects under this scheme, facilitating faster implementation and execution.
  - It aims to streamline the process of project approvals and enhance transparency in project implementation.
- **Sectoral Focus:**
  - The scheme encompasses multiple sectors, including transport (roadways, railways, airways, and waterways), energy, urban infrastructure, and digital infrastructure.
  - It aims to promote sustainable and environmentally friendly practices in infrastructure development.

### Benefits of the PM GatiShakti Scheme:

- **Economic Growth:** By enhancing infrastructure, the scheme is expected to boost productivity and contribute significantly to India's GDP.
- **Job Creation:** The development of infrastructure projects will create employment opportunities in various sectors.
- **Logistics Efficiency:** Improved logistics and transportation networks will reduce costs and time, benefiting businesses and consumers.
- **Balanced Development:** The focus on connectivity will help in reducing regional disparities and promoting balanced economic growth across the country.

### Conclusion:

- The PM GatiShakti Scheme is a transformative initiative aimed at revolutionizing India's infrastructure landscape.
- By fostering integrated and collaborative planning, the scheme seeks to create a seamless connectivity network that supports economic growth and development across the nation.

## **Precision medicine**

### **Syllabus: GS-3; General Science**

#### **Context**

- Precision medicine is bringing in a new era of personalised healthcare. The field began to take concrete shape when scientists were wrapping up the Human Genome Project.
- Since then, genomics has played a major role in the diagnosis and treatment of various cancers, chronic diseases, and immunological, cardiovascular, and liver diseases.

#### **About**

- Precision medicine, also known as personalized medicine, is a medical approach that tailors treatment and healthcare strategies to the individual characteristics of each patient.
- This approach considers genetic, environmental, and lifestyle factors to optimize prevention, diagnosis, and treatment.

#### **Key Features:**

- **Individualization of Treatment:** Unlike traditional one-size-fits-all medicine, precision medicine focuses on the specific needs of individual patients based on their unique genetic makeup and health profile.
- **Genetic Profiling:** Utilizes genetic testing to understand how a patient's genetic variations affect their response to drugs and risk of diseases.
- **Targeted Therapies:** Employs treatments that target specific molecular mechanisms involved in a disease, particularly in oncology, where certain cancers can be treated with therapies directed at specific genetic mutations.

#### **Applications:**

- **Oncology:** Identifying genetic mutations in tumors to provide targeted therapies, improving treatment efficacy and reducing side effects.
- **Cardiology:** Genetic testing for inherited heart diseases to predict risks and customize preventive measures.
- **Infectious Diseases:** Tailoring treatments based on the genetic makeup of pathogens and the patient's immune response.
- **Autoimmune Diseases:** Adjusting therapies based on genetic predisposition and disease markers.

### Benefits:

- **Improved Outcomes:** Higher chances of treatment success and better health outcomes due to tailored approaches.
- **Reduced Adverse Effects:** Minimizes the risk of ineffective treatments and adverse drug reactions by selecting therapies based on genetic compatibility.
- **Cost-Effectiveness:** Potentially lowers healthcare costs by avoiding ineffective treatments and focusing resources on personalized care.

### Challenges:

- **Data Privacy:** Concerns about the security and confidentiality of genetic information.
- **Accessibility:** Limited access to genetic testing and precision therapies in low-resource settings.
- **Regulatory Issues:** The need for robust guidelines to ensure the safe and effective use of precision medicine.
- **Ethical Considerations:** Issues related to genetic discrimination, informed consent, and the implications of genetic modifications.

### Current Trends:

- **Advancements in Genomics:** Rapid development of technologies like next-generation sequencing (NGS) is enabling widespread use of genetic information in clinical settings.
- **Integration into Healthcare Systems:** Increasing incorporation of precision medicine into standard medical practice, with a focus on personalized treatment plans.
- **Research and Innovation:** Continuous research into biomarkers and new therapeutic targets is driving the growth of precision medicine.

### Global Initiatives:

- **All of Us Research Program:** A U.S. initiative aimed at gathering health data from diverse populations to advance precision medicine.
- **Genomics England:** A program in the UK focused on genomic sequencing to improve healthcare and research.
- **International Collaborations:** Various global efforts to share data and research in genomics to facilitate the development of precision medicine.

## **Haber-Bosch process**

**Syllabus: GS-3; Science and Technology**

### **Context**

- The Haber-Bosch process is at the center of discussions surrounding sustainable agriculture, energy efficiency, and climate change mitigation.

### **About**

- The Haber-Bosch process is a key industrial method for synthesizing ammonia from nitrogen and hydrogen gases. This process is crucial for producing fertilizers and has had a significant impact on agriculture and food production worldwide. Here's an overview of its main aspects:

### **Overview**

- **Discovery:** Developed by Fritz Haber and Carl Bosch in the early 20th century, the process was first industrially implemented around 1910.
- **Significance:** The Haber-Bosch process revolutionized agriculture by providing a means to produce ammonia at scale, leading to the mass production of nitrogenous fertilizers.

### **Chemical Reaction**

- The overall reaction can be summarized as: 
$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$$
- **Reactants:** Nitrogen ( $\text{N}_2$ ) from the atmosphere and hydrogen ( $\text{H}_2$ ), which can be derived from natural gas (methane) or other sources.

### **Conditions**

- **Temperature:** The process typically operates at temperatures between 400°C and 500°C.
- **Pressure:** High pressures of about 150 to 300 atmospheres are used to favor the formation of ammonia.
- **Catalyst:** Iron-based catalysts are commonly used to accelerate the reaction.

### Process Steps

- **Gas Preparation:** Nitrogen is obtained from the air, while hydrogen is often produced through steam reforming of methane.
- **Reforming:** Methane reacts with steam to produce hydrogen and carbon dioxide.
- **Compression:** The gas mixture (nitrogen and hydrogen) is compressed to high pressure.
- **Reaction:** The compressed gases are passed over the catalyst in a reactor, where ammonia is formed.
- **Cooling and Separation:** The gas mixture is cooled, allowing ammonia to condense. Unreacted gases are recycled back into the system.

### Environmental Impact

- **Sustainability Concerns:** While the Haber-Bosch process has significantly increased food production, it also has environmental implications. The use of fossil fuels for hydrogen production contributes to greenhouse gas emissions.
- **Nitrogen Cycle Disruption:** The widespread use of synthetic fertilizers can lead to soil and water pollution, affecting ecosystems.

### Modern Developments

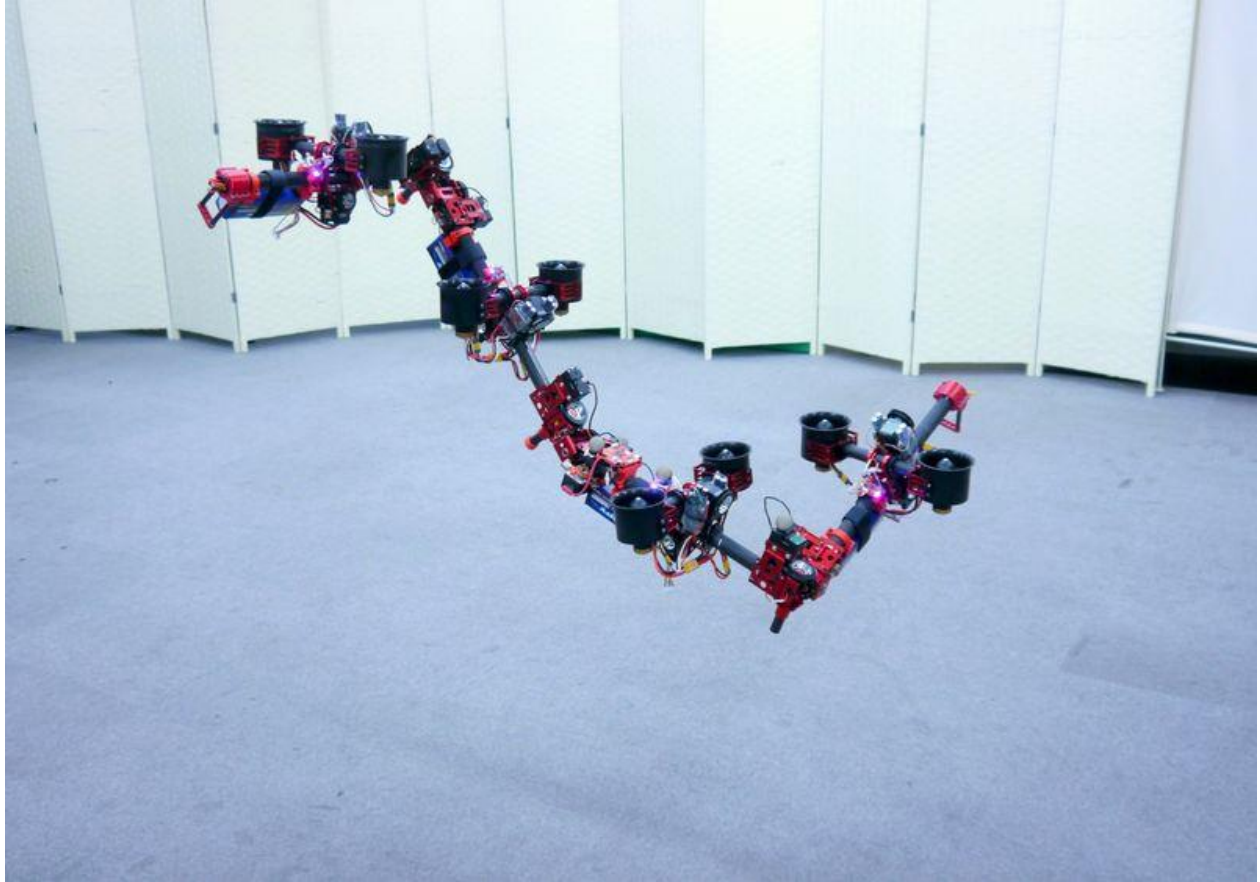
- **Research:** Ongoing research aims to improve the efficiency of the Haber-Bosch process and explore alternative methods for ammonia synthesis that are more environmentally friendly.
- **Green Hydrogen:** The development of renewable energy sources for hydrogen production (such as electrolysis) is being explored to mitigate the environmental impact.

## Dragon Drone

### Syllabus: GS-3; Science & Technology

#### Context

- A deadly new weapon in the Russia-Ukraine War, dragon drones are known to emit a molten metal that burns at 2,427 degree Celsius, essentially raining down fire.



### About

- Dragon drones are advanced **unmanned aerial vehicles (UAVs)** equipped to deliver a substance called thermite, a mixture of aluminum and iron oxide, primarily used in welding applications, particularly for railroad tracks.
- When ignited, thermite initiates a self-sustaining reaction that generates extremely high temperatures, capable of burning through a variety of materials, including:
  - **Clothes**
  - **Vegetation**
  - **Military-grade vehicles**
  - **Human tissue** (causing severe burns and bone damage)

### Key Features and Usage

- **Deployment:** Dragon drones are thought to have first been utilized in the Russia-Ukraine war around September 2023.
- Reports indicate that Ukrainian forces used these drones to ignite vegetation utilized by Russian troops for cover, exposing them to direct attacks.
- **Response:** Following their initial use by Ukraine, Russian forces also began developing and deploying their own dragon drones.



- **Effectiveness:** The combination of thermite with high-precision drones makes them particularly effective and dangerous, as noted by advocacy groups like Action on Armed Violence (AOAV).

### Historical Context of Thermite in Warfare

- **World War I:** German zeppelins dropped thermite-laden bombs, marking an innovative use of the substance in warfare.
- **World War II:** Thermite bombs were extensively used by both Allied and Axis forces, with estimates suggesting the Allies dropped around 30 million 4-pound thermite bombs on Germany and another 10 million on Japan.
- Thermite hand grenades were also employed to disable artillery without explosive detonation.
- **Modern Usage:** In contemporary conflicts, thermite is often utilized by special operations teams and espionage agents due to its ability to produce intense heat without a loud explosion.

### Legal Status of Thermite in Warfare

- The use of thermite as a weapon is not explicitly prohibited under international law. However, its application against civilian targets is restricted under the **Convention on Certain Conventional Weapons**, which outlines limitations for incendiary weapons.
- Experts, like Marina Miron from King's College London, highlight that while thermite is not banned, its indiscriminate nature necessitates strict adherence to military target guidelines to avoid severe civilian injuries.

## Wayanad Wildlife Sanctuary

### Syllabus: GS-3; Biodiversity

#### Context

- Wayanad Wildlife Sanctuary's vulture survey records 80 birds

#### About

- **Establishment:** The sanctuary was established in 1973 as a part of the Nilgiri Biosphere Reserve.

- **Area:** It spans approximately 345 square kilometers.
- **Location:** The sanctuary is situated on the western slopes of the Western Ghats, bordered by the towns of Wayanad, Kalpetta, and Sultan Bathery.

### Flora and Fauna

- **Biodiversity:** The sanctuary is home to a rich variety of flora and fauna, including:
  - **Mammals:** Asian elephants, tigers, leopards, deer (sambar and spotted), wild boars, and several species of primates such as the Nilgiri langur and bonnet macaque.
  - **Birds:** Over 200 species of birds can be spotted, including the Malabar grey hornbill, woodpeckers, and various migratory birds.
  - **Reptiles:** The sanctuary houses various reptiles, including snakes and lizards.
  - **Plant Life:** It features a diverse range of vegetation, from tropical deciduous forests to evergreen and semi-evergreen forests, along with grasslands.

### Activities

- **Trekking:** Various trekking trails are available for nature enthusiasts to explore the rich biodiversity of the sanctuary.
- **Wildlife Spotting:** The sanctuary offers opportunities for wildlife enthusiasts to observe animals in their natural habitat.
- **Photography:** With its stunning landscapes and diverse wildlife, the sanctuary is a favorite spot for wildlife photographers.

### Conservation Efforts

- The Wayanad Wildlife Sanctuary is part of the larger Nilgiri Biosphere Reserve, aimed at conserving the unique ecosystems of the Western Ghats.
- Efforts are made to protect the wildlife and their habitats, including anti-poaching measures and community awareness programs.

### Accessibility

- **Entry Points:** The main entry points are Muthanga and Tholpetty.
- **Best Time to Visit:** The ideal time to visit is between October and May when the weather is pleasant and wildlife sightings are more likely.

### Accommodation

- Various accommodations are available near the sanctuary, including eco-lodges, resorts, and guesthouses, offering a chance to enjoy the natural beauty of the region.

### Significance

- The sanctuary plays a vital role in the conservation of endangered species and maintaining the ecological balance of the region.
- It also contributes to the local economy through eco-tourism.