

DAILY CURRENT AFFAIRS (DCA)

Time: 45 Min

Date: 09-09-2026

Table of Content

From Mercator to Equal Earth: The Evolution of World Maps
Comparison Between Judicial Appointments in India and South Africa
Western Dedicated Freight Corridor (WDFC)
Sea-level Rise is a Threat to Fundamental Human Rights: UN Report

News In Short

Endometriosis
Orangutan
Anti-smog Guns
Permafrost Melting
Slumping: A Soft-coral Threat
Plug-in Hybrid Electric Vehicle (PHEV)
Veer Guardian-2026

FROM MERCATOR TO EQUAL EARTH: THE EVOLUTION OF WORLD MAPS

Context

- The United Nations has adopted a resolution to shift away from the **16th-century Mercator map** of the world towards one that more accurately depicts Africa's vast size.

Why Earth Cannot Be Accurately Shown on a Flat Map?

- Earth is an **oblate spheroid**, rather than a perfect sphere, because of its rotation, gravitational effects and uneven distribution of land and oceans.
- A map projection **converts the three-dimensional curved surface of Earth** into a **two-dimensional plane**, inevitably introducing some distortion.
- Every projection involves a **trade-off between area, shape, distance and direction**.
- Therefore, no single flat map can simultaneously preserve all geographical properties accurately.

About Mercator Projection

- Origin:** The Mercator layout was introduced by the **Flemish (present-day Belgium)** geographer and mapmaker **Gerardus Mercator** in **1569** to help sailors navigate the world.

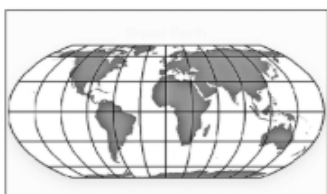
- It is a **conformal, cylindrical map**. This means Mercator projected the Earth's surface as if unwrapped from a cylinder around the globe.
- In the 18th century, it became the standard map projection for navigation due to its **property of representing rhumb lines as straight lines**.
- The Mercator projection has a **grid pattern with longitudes and latitudes at 90-degree angles**.
 - The longitudes (vertical lines) are evenly spaced, but the distances between the latitudes (horizontal lines) increase as one moves away from the equator towards the poles.
- The result is that Mercator projection inflates the size of lands the farther they are from the equator.
 - Therefore, landmasses such as **Greenland and Antarctica appear far larger** than they actually are relative to landmasses near the equator.

Concern with Mercator projection

- The Mercator layout has been the world's most widely used projection for centuries. However, it has also long been **criticised for exaggerating the size of regions towards the poles** relative to those closer to the equator.
- The most infamous example of these distortions is its **depiction of the African continent**, which appears similar to Greenland—an island 14 times smaller and about the size of the Democratic Republic of the Congo.

• WHICH PROJECTION TO PICK?

Choosing a projection depends entirely on the purpose of the map. According to Dr Siva Kumar, these are the ideal use-cases of different projections:



Equal Earth

THEMATIC AND STATISTICAL DATA:

Use equal-area projections (like the Equal Earth map) which show correct relative sizes of landmasses, making them ideal for population density, climate, or land-cover maps.



Robinson

GENERAL REFERENCE AND WORLD MAPS:

Use compromise projections, such as the Robinson projection or Winkel Tripel. They do not perfectly preserve any single dimension, but they balance shape and area distortion to create a visually natural view of the whole Earth.



NAVIGATION AND DIRECTION:

Use conformal projection: (like the Mercator projection). They preserve true angles and local shapes, allowing pilots and sailors to plot straight-line compass courses, though the severely distort high-latitude sizes.



POLAR OR SINGLE-POINT STUDIES:

Use Azimuthal/Planar projections. They project the earth onto a flat plan from a central point, making them best for polar regions or flight-distance routes.

Evolution of Alternative Projections

- **Gall-Peters projection:** It preserves area but significantly distorts shapes.
- **Robinson projection:** A compromise projection designed to balance distortions in area and shape.
- **Winkel Tripel projection:** It balances distortion in area, distance and direction and was adopted by the National Geographic Society in 1998.
- **Equal Earth projection:** It preserves relative area while limiting shape distortion.

The Equal Earth map

- The Equal Earth map, **developed in 2018**, is an equal area projection (there are others, too) that seeks to **preserve the relative areas of landmasses**.
- It, too, somewhat **distorts shapes and distances**, with meridians curving gently towards the poles.

Source: IE

COMPARISON BETWEEN JUDICIAL APPOINTMENTS IN INDIA AND SOUTH AFRICA

Syllabus: GS2/ Polity and Governance

Context

- The debate over judicial appointments has gained attention following the Supreme Court's observations in **Arvind Malhotra v. High Court of Himachal Pradesh**, with **South Africa's appointment process** offering a comparative perspective.

South Africa's Judicial Appointment Model

- South Africa follows a **more transparent and participatory system** through the constitutional entity, the **Judicial Service Commission (JSC)**.
- The JSC comprises **senior judges, members of the legal profession and legal academics**, with limited political representation.

- The process begins with calls for nominations by the commission, followed by the drafting of a **short list**.
 - ♦ Public comments are sought on the candidates. The proceedings are broadcast on **national television and radio channels**.
 - ♦ An interview conducted in public determines their suitability for appointment to various levels of court.
- If the **Commission's members cannot agree** on who to appoint, the **matter is put to a vote**.
 - ♦ The identity of who votes for whom and who votes against a particular nominee is kept confidential.
- **Judicial Accountability:** Judges in South Africa do not enjoy special immunity. Complaints of misconduct can be investigated by the **Judicial Service Commission**.
 - ♦ In cases of gross misconduct, the appropriate body may recommend **impeachment through Parliament**, subject to constitutional procedures.

Appointment of Judges of the Supreme Court of India

- **Article 124** provides for the appointment of judges of the Supreme Court by the President after consultation with constitutional authorities.
- When a vacancy is to be filled, the **Chief Justice of India (CJI)** initiates the process and forms his opinion in consultation with a **Collegium comprising the four senior-most puisne Judges of the Supreme Court**.
- The CJI also ascertains the views of the senior-most Supreme Court judge from the High Court from which the recommended candidate comes.

What is the Collegium System?

- The Collegium System is the mechanism through which judges of the Supreme Court and High Courts are appointed and transferred by the judiciary itself **without any specific constitutional or statutory provision**.
- The system evolved through a **series of Supreme Court judgements known as the Three Judges Cases**, which established the primacy of the judiciary in judicial appointments.

- **At the Supreme Court level**, the Collegium consists of the Chief Justice of India and the four senior-most judges of the Supreme Court.
- **At the High Court level**, the Collegium comprises the Chief Justice of the High Court and the two senior-most judges of that High Court.

What is the Memorandum of Procedure (MoP)?

- The MoP is the **list of rules and procedures for the appointment of judges to the Supreme Court and the high courts**. It is a document framed by the government and the judiciary together.
- The procedure was evolved through three Supreme Court judgments that are popularly known as the three judges cases.
 - ♦ These are: **SP Gupta v Union of India (1981)**, **Supreme Court Advocates-on-Record Association v Union of India (1993)**, and **In re Special Reference No. 1 of 1998**.
 - ♦ After these judgments, the Union government framed an MoP in 1999.

Key Issues Raised

- **Transparency vs Confidentiality:** Confidentiality protects candidates and judges from external pressure and reputational damage. However, excessive secrecy can create perceptions of arbitrariness, favouritism and lack of accountability.
- **Collegium vs Representative Institutions:** The Indian collegium involves judges in judicial appointments, whereas a representative commission can potentially include members from the judiciary, legal profession, academia and other constitutional institutions.
 - ♦ However, excessive political participation may threaten judicial independence.
- **Judicial Independence vs Public Accountability:** Judicial independence requires protection from executive and political interference.
 - ♦ At the same time, independence cannot imply complete absence of accountability.

Way Ahead

- The South African experience demonstrates that greater openness in judicial appointments need not necessarily undermine judicial independence.
- For India, the central challenge is not simply choosing between secrecy and transparency but developing an institutional framework that protects judges from political influence while ensuring that appointments command public confidence.

Source: IE

WESTERN DEDICATED FREIGHT CORRIDOR (WDFC)

Syllabus: GS3/Infrastructure

Context

- Prime Minister Modi dedicated **Western Dedicated Freight Corridor (DFC)** to the nation.

About Dedicated Freight Corridor

- The Indian Railways' **quadrilateral linking the four metropolitan cities of Delhi, Mumbai, Chennai and Howrah**, is commonly known as the **Golden Quadrilateral**.
- The Freight Corridor (DFC) project was conceived in **2005** and two DFCs, namely **Eastern DFC (EDFC)** and **Western DFC (WDFC)** were approved by the Cabinet in **2008**.



- At present, **there are two major DFCs. These are:** the Eastern Dedicated Freight Corridor (EDFC) and the Western Dedicated Freight Corridor (WDFC). Together, they form a network of around **2,843 km**.
- **The Eastern Dedicated Freight Corridor (EDFC)** is around 1,337 km long.

- ♦ It starts from **New Sahnewal in Punjab** and **extends up to New Sonnagar in Bihar**, passing through Haryana and Uttar Pradesh.
- ♦ It was completed in **2023**, it connects **coal-producing states and passes** through **regions rich in raw materials including iron ore, bauxite and coking coal**.
- **The Western Dedicated Freight Corridor (WDFC)** is around 1,506 km long.
 - ♦ It starts from **New Dadri in Uttar Pradesh** and **runs up to New JNPT in Maharashtra**, passing through Haryana, Rajasthan and Gujarat.
 - ♦ The corridor connects major industrial areas with important logistics centres and ports, including the Jawaharlal Nehru Port area in Maharashtra.
- **The Dedicated Freight Corridor network** is set to expand further with the announcement of **a third DFC in the Union Budget**.
 - ♦ The proposed 2,052-km-long corridor will start from **Dankuni in West Bengal** and **connect to Surat in Gujarat**.
 - ♦ **The new DFC will connect six states:** West Bengal, Odisha, Chhattisgarh, Madhya Pradesh, Maharashtra and Gujarat.

Major Features:

- **Double-stack Container Trains:** One of the important changes brought by the DFC network is the movement of double-stack container trains. These trains can carry two layers of containers, allowing more cargo to be moved in a single train.
- **Unlike conventional railway lines**, the DFC is reserved for freight trains and **permits speeds of up to 100 kilometres per hour (kmph)**.
 - ♦ The average time taken to cover 100 km on the Western DFC is about two-and-a-half hours, compared with nearly six hours on an average railway track.

Significance

- The dedicated freight routes are providing **additional capacity for freight trains and reducing the pressure of freight traffic** on the existing railway network.

- ♦ This provides **additional capacity for operation of passenger trains** and gives impetus to the country's logistics efficiency, supply chain and economic development.
- It is expected to cut by about **60% the time a freight train** takes to cover the route on the mixed-use Indian Railways tracks.
- ♦ The optimum potential for **cost savings in container cargo at about 25%**.

Source: BS

SEA-LEVEL RISE IS A THREAT TO FUNDAMENTAL HUMAN RIGHTS: UN REPORT

Syllabus: GS3/Environment

Context

- A recent UN Special Report, Challenges related to sea-level rise and ways and approaches to address it, highlighted escalating threats to infrastructure, human rights, livelihoods, culture and statehood.

Scale and Drivers of the Crisis

- Rising seas are primarily driven by **warming ocean waters and melting glaciers and ice sheets**.
 - ♦ In **2024**, the annual global sea-level rise reached **5.9 mm**, the highest level ever recorded.
 - ♦ Around **770 million people**, or nearly **10% of the global population**, live in coastal areas **less than five metres above the high-tide line** and face significant risks.
 - ♦ **Up to 1.2 billion people could be displaced by 2050** without urgent adaptation.

Unequal Regional Impacts

- **Coastal Cities:** Cities such as **Miami, New York and Guangzhou** face enormous financial exposure. Coastal assets at risk are estimated at **\$2–3.5 trillion**.
- **South Asian Deltas:** In low-lying South Asian deltas, the principal concern is human displacement. **More than 14 million people in Kolkata, Mumbai and Dhaka** are at immediate risk of losing their homes to permanent inundation.

- **Human Rights and Cultural Identity:** Sea-level rise threatens fundamental rights, including access to **adequate housing, safe drinking water, sanitation, food, healthcare and education**.
 - ♦ Flooding and coastal erosion can destroy homes, schools, hospitals and agricultural land.
 - ♦ **Saltwater intrusion** contaminates freshwater resources and soils, while damaged sanitation systems increase exposure to **water-borne diseases**.
- **Small Island Developing States (SIDS), Indigenous Peoples and low-lying coastal communities** are particularly vulnerable.
 - ♦ For Indigenous Peoples, the loss of ancestral lands can sever **cultural identity, spiritual connections and intergenerational transmission of traditional knowledge**.
- Thus, climate-induced displacement is not merely an economic issue but a **human-rights and cultural-identity challenge**.

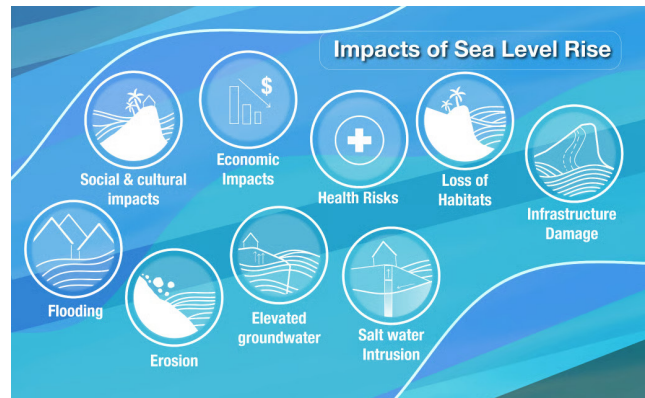
Economic and Legal Challenges

- Coastal infrastructure damage is already estimated at **more than \$1.8 trillion**. Without adequate adaptation, annual global losses could reach **\$1.2–4 trillion by the end of the century**.
- Sea-level rise creates unprecedented legal questions concerning **statehood, sovereignty, nationality and maritime boundaries**, especially for island states facing permanent territorial loss.

Rise of Sea Level in India

- **Current Trend:** India's sea level is **rising gradually due to climate change**, mainly because of **ocean warming (thermal expansion)** and **melting glaciers/ice sheets**.
 - ♦ Long-term observations indicate an average rise along the Indian coast of roughly **3.3 mm/year**, though rates vary regionally.
 - ♦ **Relative sea-level rise** can be higher locally because of **land subsidence**, groundwater extraction and sediment compaction.

- **Most Vulnerable Regions:** **Mumbai, Kolkata, Chennai and other coastal cities** face increasing risks from flooding and storm surges.
 - ♦ **Sundarbans and Ganga-Brahmaputra-Meghna delta** are particularly vulnerable because of their low elevation.
 - ♦ **Small islands**, including parts of the **Andaman & Nicobar and Lakshadweep**, face heightened exposure.



Government/Policy Response

- **National Centre for Coastal Research (NCCR)** monitors shoreline changes and coastal vulnerability.
- **INCOIS** provides ocean information, forecasts and early-warning services.
- **Coastal Regulation Zone (CRZ) framework** seeks to regulate environmentally sensitive coastal development.
- **National Disaster Management Authority (NDMA)** and state agencies focus on cyclone preparedness, evacuation and resilient infrastructure.
- **Mangrove restoration and nature-based solutions** can provide protection against storm surges and erosion.

Way Forward

- Effective adaptation requires:
 - ♦ Early action and reliable scientific assessments;
 - ♦ Early-warning systems and resilient infrastructure;
 - ♦ Faster greenhouse-gas emission reductions;
 - ♦ Greater and predictable climate-adaptation finance;

- ♦ Technology transfer and stronger international cooperation; and
- ♦ People-centred and human-rights-based planning.
- Developing countries face a severe financing gap: annual adaptation needs are estimated at **\$310–365 billion**, against only **\$26 billion in adaptation finance in 2023**.
- For India, coastal planning needs to integrate **disaster resilience, sustainable urbanisation, ecosystem-based adaptation and protection of vulnerable communities**.

Source: DTE

NEWS IN SHORT

ENDOMETRIOSIS

Context

- A first-of-its-kind Indian study has identified **21 genetic regions linked to endometriosis**, offering new clues to **why some women may be more prone to the disease**.

About Endometriosis

- Endometriosis affects an **estimated 10% (190 million) of reproductive age women worldwide**.
- In endometriosis, **endometrium-like tissue** (usually found only in the lining of the uterus) grows outside the uterus, causing inflammation and scar tissue formation.
- **Symptoms include:** severe pain during menstruation; heavy menstrual bleeding; chronic pelvic pain ; infertility; and abdominal bloating and nausea.
 - ♦ Endometriosis most commonly occurs in the pelvis but in some women, occurs elsewhere in the body, including the abdomen and chest.
- **Endometriosis can impact** sexual intercourse, bowel movements and/or urination; and mental health (including depression and anxiety).
- **The causes of endometriosis are unknown.** Emerging research suggests that endometriosis is associated with immune system dysregulation.

- **There is currently no cure** for endometriosis; access to early diagnosis and effective treatment of endometriosis is limited in many settings and treatment aims to control symptoms and limit long-term impacts.

Source: IE

ORANGUTAN

Context

- The Odisha Forest Department rescued five young orangutans after they were found abandoned in a casuarina plantation in the Udayapur-Talsari forest area of Balasore district.

About Orangutan

- **Characteristics:** Orangutans are the **largest arboreal mammal**, spending most of their time in trees.
 - ♦ They are the closest living relatives of humans and they share **96.4%** of Human genes and are highly intelligent creatures.
- **There are three species of Orangutan** – the Bornean, Sumatran and Tapanuli – which differ a little in appearance and behavior.
- **Eating habitats :** Orangutans mainly eat fruits, such as mangoes, lychees and figs, but they also feed on young leaves, flowers, insects, and even small mammals.
- **Habitat and Distribution:** They can occur up to **1,500m** above sea level, most are found in lowland areas and prefer forests in river valleys or floodplains.
 - ♦ These great apes are only found in the wild on the islands of Borneo and Sumatra.
- **IUCN status:** All three orangutan species are **critically endangered**.



Source: TH

ANTI-SMOG GUNS

In News

- The Delhi government has approved spending ₹100 crore for 1,000 truck-mounted “anti-smog” guns to be operated across the city in the winter months over three years.

Anti-smog gun

- Anti-smog guns are **equipment that spray the atmosphere** with fine droplets of nebulised water to absorb the smallest dust and contaminated particles.
- The gun is attached to a water tank which is on a truck.
- It is built in such a way that, by passing through high-pressure nozzles, it turns the water into a fine spray with droplets of a size of 50-100 microns.

Importance

- It reduces air pollution by binding dust and other particulate matter (PM2.5 and PM10) and carrying them down to the ground level along with water.
- It creates a canopy effect and works like rain to bring down the suspended particles wafting in the atmosphere.
- It contains air pollution in cities, and it also helps in controlling industrial dust in mining, grinding, coal, and stone crushing.

Source: HT

PERMAFROST MELTING

In News

- According to a recent study, melting permafrost in the Arctic could cause infrastructure damage worth \$261 billion by the middle of the 21st century.

Permafrost

- Permafrost is any ground that remains completely frozen — 32°F (0°C) or colder — for at least two years straight.
- These permanently frozen grounds are most common in cold regions.
- These include high mountains and Earth's higher latitudes — near the North and South poles.
- It covers about 24 per cent of the Northern Hemisphere, including large areas of Alaska, Canada, and Siberia
- It is made of a combination of soil, rocks, and sand that are held together by ice.

- The soil and ice in permafrost stay frozen all year long.

Impacts of climate change

- Permafrost loss, also known as permafrost thaw, is the progressive loss of ground ice in permafrost, usually due to the input of heat.
- Global warming patterns are causing permafrost to melt.
 - This melting releases previously stored greenhouse gases.
- Climate warming is accelerating the thawing of permafrost and melting ground ice and destabilising soils, which can ruin buildings, roads and other infrastructure in northern communities.
- Thawing also activates microorganisms that break down previously frozen organic detritus, releasing CO₂ and methane and generating a positive feedback that further enhances warming.
- It might also release ancient bacteria and viruses frozen in the soil.

Source: DTE

SLUMPING: A SOFT-CORAL THREAT

Context

- UNESCO-listed soft corals, mostly around uninhabited islets south of Jeju, South Korea are showing the ‘**slumping**’ phenomenon.

About

- Unlike hard corals supported by rigid calcium carbonate skeletons, **soft corals rely on internal fluid pressure to keep upright**.
 - Environmental changes can disrupt that pressure, **leading them to slump or collapse**.
- Weather conditions and water flowing down from China's Yangtze River** are affecting the area's salinity triggering slumping.

There are two main types of corals: hard corals and soft corals.

- Soft corals** are **soft and bendable** and often resemble plants or trees.
 - These corals **do not have stony skeletons** and are **non-reef-building corals**—instead, they grow wood-like cores and fleshy rinds for protection. **Like hard corals, they tend to live in colonies.**

- **Hard corals** grow in colonies and are often referred to as “**reef-building corals.**”
 - ♦ Hard corals create **skeletons out of calcium carbonate**, a hard substance that eventually **becomes rock.**
 - ♦ Over time, this rock builds up to form the foundation of a **coral reef and provides a structure upon which baby corals can settle.**
 - ♦ Hard corals depend upon tiny algae called **zooxanthellae** that live inside them.
 - ♦ Together, they share a **symbiotic relationship**—the corals provide the zooxanthellae with shelter, and in return, the zooxanthellae provide the corals with food.

Source: TH

PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV)

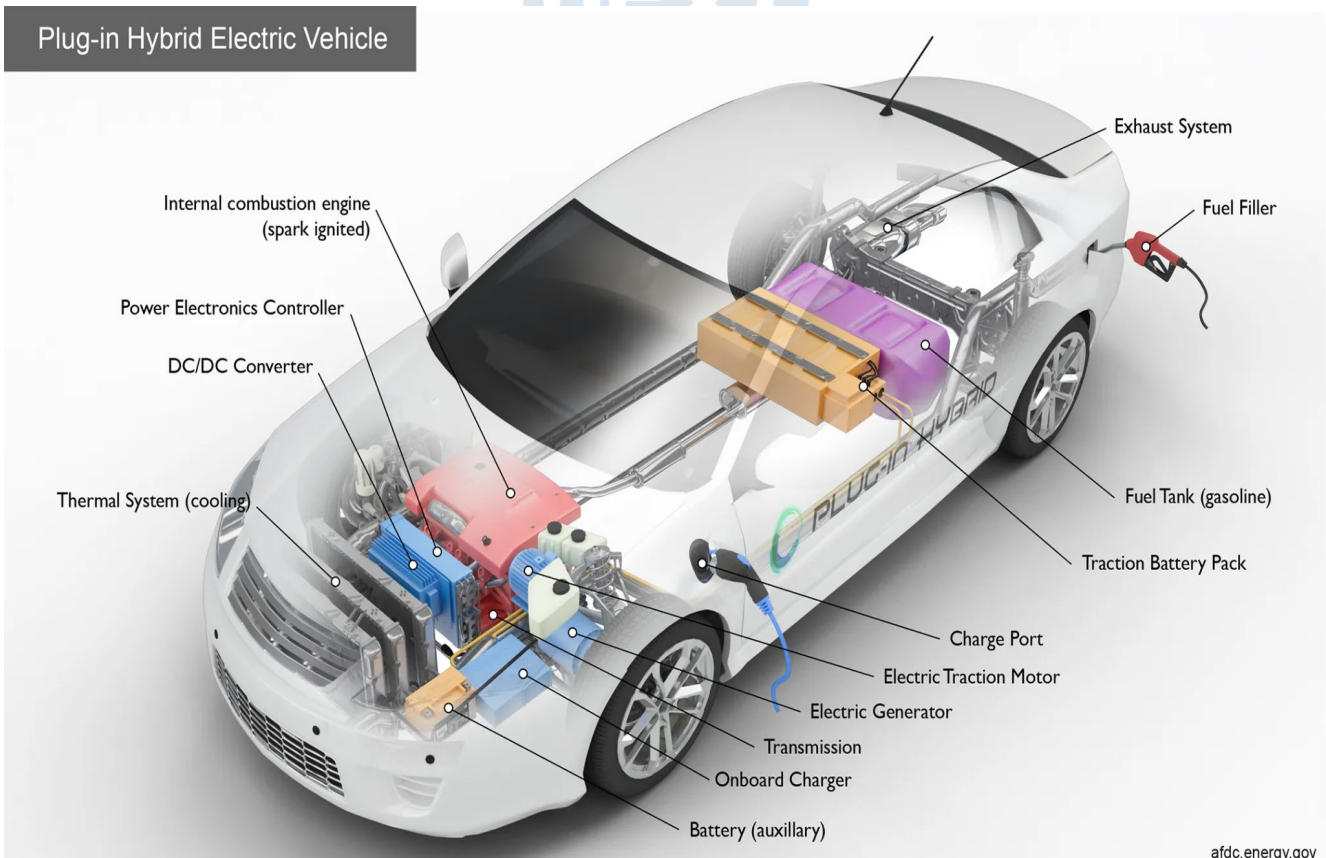
Context

- JSW MG Motor India has rolled out Hector Tomahawk in Battery Electric Vehicle (EV)

and **Plug-in Hybrid Electric Vehicle (PHEV) variants**, indicative of the rising diversity in India's clean-mobility environment.

Plug-in Hybrid Electric Vehicle (PHEV)

- A Plug-in Hybrid Electric Vehicle PHEV combines an **internal combustion engine (ICE)** with an electric motor and a rechargeable battery such that the vehicle can run on electric power, the engine or both.
- A PHEV is **similar to a normal hybrid electric car (HEV)**, but has a larger battery and can be charged by **plugging the car into an electrical source**, in addition to charging through regenerative braking and the engine.
- Its larger battery provides a **longer electric-only driving range**, enabling short-distance journeys to be completed primarily on electricity, while the ICE **provides greater range for long-distance travel** and reduces range anxiety.
- PHEVs, however, tend to be **more expensive and physically complex** than conventional vehicles.



Source: IE

VEER GUARDIAN-2026

Context

- The India-Japan bilateral air exercise, **Veer Guardian-2026**, began at Air Force Station Jodhpur.

About

- The **inaugural edition** of the bilateral air exercise was held in **2023**. Veer Guardian-2026 aims to enhance tactical proficiency and aerospace

operational synergy, reflecting the deepening strategic partnership between India and Japan.

Do you know?

- The **JIMEX** series of exercises between India and Japan began in **2012**, with a focus on strengthening **maritime security cooperation**.

Source: PIB

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