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The India Meteorological Department (IMD) has reaffirmed its forecast that the 2025 southwest monsoon will bring 'above normal' rainfall across most of India. This update, made in late May, builds on the April prediction and is critical given India's reliance on monsoon for agriculture, drinking water, and energy.

IMD retains 'above normal' rainfall outlook for monsoon

Monsoon likely to slow down as it moves towards Delhi and northern India, but speedy advance may spare the capital from heatwaves, say IMD officials; absence of El Nino favours rainfall

Jacob Koshy
NEW DELHI

The India Meteorological Department (IMD) has retained its April forecast for 'above normal' rainfall from June to September. It expects the country to see about 92 cm rainfall (106% of the long period average) during this southwest monsoon, slightly higher than the 91.3 cm (105% of the average) rainfall that it had forecast in April.

Except the northeast and northwestern parts of the country, most of India will receive 'above normal' rainfall.

In June alone, the country is likely to receive at least 8% more than its average rainfall of 16.7 cm.

The monsoon came early this year, reaching Kerala on May 24, a week ahead of its normal onset date of June 1. Not since the monsoon of 2009 has its arrival been this early. Moreover, the monsoon also advanced to Mumbai early, breaking a 35-year record by reaching the city on May 26, two weeks ahead of the norm.

The seasonal rains advanced faster than usual to many parts of Karnataka, Goa, and central Maharashtra.

Mighty showers: Fire brigade personnel clear a fallen tree blocking a road in Mumbai, amid heavy rainfall. In a separate incident on Monday, a 26-year-old man died in a tree collapse. PTI

At a press conference on Tuesday, IMD officials said that a confluence of factors had played a role in "advancing the monsoon", including a pre-cyclonic circulation and optimal temperatures in the Tibetan plateau, along with a couple of other global factors.

While more rain is expected for the next four days in parts of Odisha and central India, the monsoon "would not continue to speed" indefinitely, according to officials. "We cannot say that the monsoon will continue to speed towards Delhi and northern India. There will be a slowdown," said IMD Director-General M. Mohapatra. The normal date for the monsoon's arrival in Delhi is the last week of June. Even if the rains do not arrive early, however, the overall strong monsoon means that heatwaves are unlikely to ravage the capital region in June, Mr. Mohapatra added.

Advisories from the Maharashtra government have also warned farmers to wait for a few days before commencing sowing.

A swathe of central India, Odisha, and parts of Rajasthan is also likely to receive 6% more rain than normal.

The main factor favouring a good monsoon is the absence of an El Nino, which is associated with a warming of the Central Equatorial Pacific Ocean, and is also associated with weak monsoon rainfall about 60% of the years when it is in effect.

Key Highlights:

- **Forecast Retained:** IMD expects 106% of the Long Period Average (LPA) rainfall (approx. 92 cm) for June–September, reaffirming its April prediction.
- **Early Onset:** Monsoon arrived in Kerala on May 24 (a week early) and in Mumbai on May 26, breaking a 35-year record.
- **Rapid Advance:** Fast progression observed in Karnataka, Goa, and Maharashtra, attributed to favorable regional and global factors (e.g., pre-cyclonic circulations, Tibetan Plateau temperatures).
- **Geographical Spread**: Central India, Odisha, and parts of Rajasthan may receive 6–8% more rainfall than average. However, northeast and northwest India may see normal to below normal rainfall.
- **El Nino Absent:** The absence of El Nino (often linked with weak monsoons) favors strong monsoon performance.

Implications for Weather and Agriculture:

- **Delhi & Northern India:** Although advance may slow, strong monsoon could prevent severe heatwaves in June.
- **Agricultural Advisory:** Farmers in Maharashtra have been advised not to start sowing immediately, to avoid crop damage from initial uneven rainfall.
- **Disaster Risks:** Incidents like tree collapses in Mumbai highlight risks from early intense showers; urban resilience and disaster preparedness remain crucial.

Conclusion:

The IMD's prediction of an above-normal monsoon brings hope for agricultural output and water availability. However, regional imbalances, sudden intense downpours, and early arrival necessitate careful planning and adaptive strategies, particularly in agriculture and disaster management.

UPSC PrelimsPractice Question

Ques : Consider the following statements regarding the Indian Monsoon 2025 forecast:

1. The India Meteorological Department (IMD) has forecast below-normal rainfall for most parts of India.

2. The monsoon has reached Kerala and Mumbai earlier than their normal dates in 2025.

3. The absence of El Nino is considered a favourable condition for a strong Indian monsoon.

Which of the statements given above is/are correct?

a) 1 and 2 only

b) 2 and 3 only

c) 1 and 3 only

d) 1, 2 and 3

Ans: b)

Page 06: Prerlims Fact

President Droupadi Murmu conferred Padma Awards to 68 distinguished individuals at the second civil investiture ceremony held at Rashtrapati Bhavan. This brings the total for 2024 to 139 awardees, including those honoured in the first ceremony on April 28.

Former CJI Khehar, actor Anant Nag among those given Padma awards

The Hindu Bureau
NEW DELHI

Former Chief Justice of India Jagdish Singh Khehar, dancer Shobana Chandrakumar, actor Anant Nag, footballer I.M. Vijayan, music composer Ricky Kej, and Vice-Chancellor of King George's Medical University Soniya Nityanand were among 68 eminent personalities who were honoured with the prestigious Padma awards by President Droupadi Murmu on Tuesday.

Vice-President Jagdeep Dhankhar, Prime Minister Narendra Modi, and Union Home Minister Amit Shah were among those who attended the second civil investiture ceremony at the Rashtrapati Bhavan. On April 28, during the first investiture ceremony, 71 personalities were given the Padma awards. A total of 139 distinguished persons were named for the country's civilian awards.

Droupadi Murmu presents Padma Vibhushan to Justice Jagdish Singh Khehar (retd) at the Rashtrapati Bhavan on Tuesday. ANI

Justice Khehar (retd) was awarded the Padma Vibhushan, India's second highest civilian award.

The late Sharda Sinha, a legendary folk singer, and the late Kumudini Rajnikant Lakhia, a Kathak dancer, were given the Padma Vibhushan posthumously. Lakhia's grandson and Sinha's son received the awards.

The Padma Bhushan, the third highest civilian award, was given to nine personalities, including dancer and actor Shobana Chandrakumar, businessman Nalli Kuppuswami Chetti, archaeologist Kailash Nath Dikshit, Satteiah dance exponent Jatin Goswami, actor Anant Nag, and Sadhvi Ritambhara.

The posthumous award for economist Bibek Debroy was collected by his wife.

The award for the late Manohar Joshi, former Lok Sabha Speaker and Maharashtra Chief Minister, was received by his son.

Leading immunologist and KGMU V-C Nityanand, footballer I.M. Vijayan, singer Ashwini Bhide Deshpande, actor Ashok Laxman Saraf, mask maker Reba Kanta Mahanta, musician Ricky Gyan Kej, theatre personality Barry John, and dance choreographer Mamata Shankar Ghosh were among the recipients of the Padma Shri.

Parai player Velu Aasan, businessman Sajjan Bhajanka, writer Sant Ram Deswal, and Farooq Ahmad Mir were among the Padma Shri awardees.

Key Highlights:

- **Padma Vibhushan (2nd highest civilian honour):**
  - Justice J.S. Khehar (Retd.) – Former Chief Justice of India
  - Sharda Sinha (posthumous) – Renowned folk singer
  - Kumudini Lakhia (posthumous) – Veteran Kathak dancer
- **Padma Bhushan (3rd highest):**
  - Shobana Chandrakumar – Classical dancer and actor
  - Anant Nag – Actor
  - Kailash Nath Dikshit – Archaeologist
  - Jatin Goswami – Sattriya dance exponent
  - Nalli Kuppuswami Chetti – Businessman

    - Sadhvi Ritambhara, others
- **Padma Shri (for distinguished service):**
    - I.M. Vijayan – Former Indian football captain
    - Ricky Kej – Music composer
    - Barry John – Theatre personality
    - Mamata Shankar Ghosh – Choreographer
    - Ashok Saraf, Ashwini Bhide Deshpande, and others
- Many awards were presented posthumously, including for Bibek Debroy (economist) and Manohar Joshi (former Lok Sabha Speaker).

UPSC PrelimsPractice Question

Ques: Consider the following statements:

1. The Padma Shri is the highest civilian award in India.

2. The Padma Bhushan was awarded to the archaeologist Kailash Nath Dikshit in 2024.

3. Ricky Kej, a music composer, was awarded the Padma Bhushan.

Which of the above statements is/are correct?

a) 1 and 2 only

b) 2 only

c) 2 and 3 only

d) All of the above

Ans : b)

May 28 is observed as **World Dugong Day**, spotlighting the need to protect the *dugong*(Dugong dugon*)*—India's only herbivorous marine mammal. Once widely found along the Indian coasts, dugong populations have drastically declined due to habitat destruction, pollution, overfishing, and lack of public awareness.

Along the Indian coastline, dugongs primarily inhabit warm waters around the Andaman and Nicobar Islands, the Gulf of Mannar, Palk Bay, and the Gulf of Kutch. DHARINISH CHUDASAMA

Conservation of dugongs must remain a top priority for India

The threats dugongs face worldwide include declining populations and degradation of the seagrass habitats that they feed on; in India, they are classified as 'regionally endangered'; once widespread off India, their numbers have fallen, with population size and geographic range on the wane

Priya Ranganathan

Waving meadows of emerald grasses part as a portly shape drifts through the shallow waters. Like a blimp led astray, the creature uses its front flippers to paddle gently as it nibbles on the seagrass that makes its home. Silt stirs from the shallow seafloor, coral reefs reveal themselves in a riot of colours, with shoals of fish scurrying out of the way, and an entire ecosystem comes into view.

Meet the dugong – the farmer of the sea.

May 28 is celebrated every year as World Dugong Day. Dugongs (*Dugong dugon*) are the only herbivorous mammals found in India's marine ecosystems. This gentle giant – known as the sea cow but resembling a cross between a seal and a whale – is distributed through the Indo-Pacific region. Due to their dependence on seagrass beds for habitat and food, dugongs are restricted to shallow waters, where they spend the day feeding on seagrasses of the genera *Cymodocea*, *Halophila*, *Thalassia*, and *Halodule*. They root at the base of shorter seagrass species, eating rhizomes, stems, and leaves, thus clouding the shallow waters. This is how they earned their epitaph. (Also see the addendum.)

Seagrass is low in nutrients, so dugongs feed extensively throughout the day to meet their daily requirements. They can consume 20-30 tonnes of seagrass per day, crushing leaves and stems against their horned teeth before swallowing. Unlike other marine mammals, the way they eat allows dugongs to digest cellulose, although the process wears down their teeth quickly. For this reason, dugongs rapidly regrow teeth in multiple iterations throughout their lives.

Unlike manatees, their close relatives, dugongs are more strictly marine, preferring waters a few metres deep. They are found along the Indian coastline, primarily inhabiting warm waters around the Andaman and Nicobar Islands, the Gulf of Mannar, Palk Bay, and the Gulf of Kutch. The dugong is a long-lived species, able to live up to 70 years.

Dugongs are also generally solitary or found in small mother-calf pairs. Researchers have occasionally observed small groups, but large herds – as are common in Australian waters – are rare in India.

Individuals reach reproductive maturity after only nine or ten years and can give birth at intervals of around three to five years. Due to its slow reproductive cycle, extended time to maturity, and infrequent calving, a dugong population's maximum potential growth rate is estimated to be just about 5% per year.

Threatened waters

But for their unassuming nature, dugongs are listed as being 'vulnerable' on the IUCN Red List for Threatened Species. The threats they face worldwide include rapidly declining populations and the ongoing degradation of their seagrass habitats. In India, they are classified as "regionally endangered." Once widespread in Indian waters, their numbers have dwindled to an estimated 200 individuals, with both their population size and geographic range

Halodule uninervis, a species of seagrass commonly found in Indian waters. SHIVAJI RATH

Dugongs reach reproductive maturity after nine or ten years and give birth at intervals of three to five years. Due to their slow reproductive cycle, and infrequent calving, a dugong population's maximum potential growth rate is estimated to be just about 5% per year

continuing to decline.

According to research by independent marine researcher Prachi Hatkar, coastal areas around India are increasingly under pressure from expanding residential, recreational, and agricultural activities.

As more people stake claim to these spaces, the risk of pollution rises. Pollution can also affect them directly, with studies showing the accumulation of mercury and organochlorine compounds in their muscle tissues.

Because dugongs reproduce slowly and require vast, undisturbed seagrass meadows to thrive, their populations are highly vulnerable to human disturbances. Seagrass meadows, their primary habitats, are being lost at an alarming rate.

Primary threats stem from changing fishing methods, which threaten the meadows. Fishers once relied on non-mechanised boats to fish in shallow waters, including seagrass habitats. But with the advent of modern fishing technologies, these traditional boats have steadily given way to mechanised ones.

The construction of ports, dredging, and land reclamation for industries and tourism have also wreaked havoc on these delicate ecosystems, and pollution from agricultural runoff, sewage, and industrial effluents has degraded water quality, affecting seagrass health.

The ever-present threat of climate change, perceptible in rising sea temperatures, ocean acidification, and extreme weather events like cyclones, also affects seagrass ecosystems, reducing the availability of food as well as safe breeding habitats for dugongs.

Another major threat to dugong populations in Indian waters is accidental entanglement in fishing gear, especially gillnets and trawl nets. Dugongs are air-breathing mammals that must surface regularly. But once entangled, they often drown before fishers can release them. Many of these deaths go unreported, further complicating conservation efforts.

Increased human movement and activity in dugong habitats and more boat traffic in the Gulf of Mannar, Palk Bay, and the Gulf of Kachchh – all directly threaten the species.

Dugongs also often rest near the surface, making them vulnerable to collisions with fast-moving boats, leading to injuries or fatalities.

Yet another threat is illegal hunting. While dugongs are a Schedule I species in India, enjoying the highest level of protection granted by law, poaching still occurs, especially in the remote areas of the Andaman and Nicobar Islands.

Way to the future

Unlike manatees, dugongs are shy creatures, preferring to avoid interacting with humans when possible. This creates a general lack of awareness about the species, even among coastal and fishing communities, as well as less attention from the larger conservation community. India has been party to the Convention on the Conservation of Migratory Species of Wild Animals since 1983 and has also been a signatory to the Convention's Memorandum of Understanding on Dugong Conservation and Habitat Management across their range since 2008.

In 2022, the Government of India officially announced the creation of the country's first dugong conservation reserve, spanning 448.3 sq. km in the coastal waters of Palk Bay, Tamil Nadu. Recent studies have indicated that this bay is the last stronghold for these gentle herbivores in Indian waters, and the reserve area has around 122.5 sq. km of intact seagrass beds, ensuring habitat and food for the dugong population.

This move, to protect the species at a national level, stems from long-term monitoring and research by the OMCAR Foundation (an NGO), the Wildlife Institute of India, and the Tamil Nadu Forest Department: they have been working to improve dugong conservation and seagrass restoration for more than a decade. Their efforts can go a long way in ensuring the survival of dugongs and their delicate lives.

"Dugongs are gentle giants and act as gardeners of the sea, quietly shaping our oceans by nurturing seagrass meadows," Ms. Hatkar said. "But their survival now depends on us – on how urgently we act to protect their fading habitats from pollution, coastal development, and neglect."

Helping dugong conservation

An important step people can take is to protect and restore seagrass habitats. To do so, we need rigorous mapping and monitoring of existing seagrass meadows to identify more priority conservation areas, much like the Gulf of Mannar Biosphere Reserve. Activities that damage seagrass need to be restricted, and community-led seagrass stewardship, including involving local fishers to monitor and restore seagrass, can go a long way in maintaining the dugongs' habitat. Regulating harmful fishing practices, such as banning gill nets and bottom trawling, in known dugong habitats will also help prevent accidental entanglement. We also need to promote non-destructive, sustainable fishing techniques that fisherfolk have used in the past. Alternative livelihood options such as dugong-friendly ecotourism using local youth as eco-guides can fulfil the dual role of monitoring dugong populations while raising awareness of their habitats and behaviour, all while empowering local communities.

Increasing awareness and community involvement have always been important aspects of dugong conservation. Many conservation practitioners are conducting awareness campaigns in coastal villages about the ecological importance of dugongs, and many local communities and fishers are trained to report dugong sightings or strandings, facilitating rescue operations when needed.

Another important facet is strengthening research. Researchers need more support, both financial and institutional, for long-term studies of dugong populations, behaviours, genetics, and threats. Developing citizen science programmes and using the traditional ecological knowledge of local communities will add another dimension to existing research. Additionally, advances in tagging and drone technology can be mobilised to track dugong movements and identify critical habitats.

Addendum: why seagrass matters

Seagrass is an underwater flowering plant, not to be confused with seaweed. Classified as wetland ecosystems, seagrass meadows stabilise the seafloor, support fisheries, capture carbon, and shelter marine life. Healthy seagrass is essential for dugongs and marine life such as turtles and fish. A 2022 study by the National Centre for Sustainable Coastal Management documented 516.59 sq. km of seagrass habitat in India. This translates to a carbon dioxide sequestration potential of up to 434.9 tonnes per sq. km each year. India's most extensive seagrass meadows occur along the Gulf of Mannar and Palk Bay, off the coast of Tamil Nadu, and together support more than 13 species of seagrass – the highest diversity in the Indian Ocean. The Andaman and Nicobar Islands also support rich seagrass beds and associated biodiversity. While seagrass is present in the shallow reefs of the Lakshadweep Islands and along the coast of Kachchh, they are patchy despite being ecologically significant. In Kachchh in particular, port activities and pollution threaten these coastal wetlands. The coast of Andhra Pradesh and Odisha also supports minor seagrass beds along estuaries, but these habitats are not extensive or suitable for dugong populations today.

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Ecological Role and Habitat:

- Dugongs, known as **"sea cows"**, are crucial for **maintaining seagrass meadows**, making them keystone species in marine ecosystems.
- In India, their primary habitats include:
  - **Gulf of Mannar and Palk Bay (Tamil Nadu)**
  - **Gulf of Kutch (Gujarat)**
  - **Andaman and Nicobar Islands**
- Dugongs require **shallow, undisturbed waters** with rich **seagrass ecosystems** to survive and reproduce.

Threats to Dugong Survival:

1. **Habitat Degradation:**
   - Rapid loss of **seagrass meadows** due to port construction, dredging, land reclamation, and tourism.
   - **Pollution** from industrial effluents, agricultural runoff, and sewage harms seagrass health.
2. **Climate Change:**
   - Rising temperatures, **ocean acidification**, and cyclones reduce breeding areas and food availability.
3. **Unsustainable Fishing Practices:**
   - **Mechanized boats and trawl nets** destroy shallow habitats.
   - Dugongs often die from **entanglement in gill nets**, leading to **unreported mortality**.
4. **Slow Reproduction:**
   - Dugongs take 9–10 years to mature and breed every 3–5 years. The **population growth rate is only ~5% per year**, making recovery difficult.
5. **Illegal Poaching:**
   - Despite being protected under **Schedule I of the Wildlife Protection Act**, dugongs are hunted in remote areas.
6. **Lack of Awareness and Research:**
   - Communities are often unaware of dugongs' presence or importance.
   - Limited funding for long-term ecological monitoring and tagging.

Conservation Efforts and Policy Measures:

- India is a signatory to the **Convention on Migratory Species (CMS)** and its **MoU on Dugong Conservation** (2008).
- In 2022, India established its **first Dugong Conservation Reserve** (448.3 sq. km in Palk Bay, Tamil Nadu), covering 122.5 sq. km of intact seagrass meadows.
- Long-term collaboration involving **OMCAR Foundation, WII, and the Tamil Nadu Forest Department** has been vital.

Way Forward: Policy and Community Interventions:

1. **Seagrass Protection:**
   - Identify and map priority areas.
   - Regulate damaging activities like dredging and trawling.
   - Encourage community-led restoration and stewardship.
2. **Community Awareness:**
   - Promote **eco-tourism**, training youth as dugong guides.
   - Involve fishers in dugong monitoring and protection.
3. **Fisheries Regulation:**
   - Ban destructive gear in known dugong zones.
   - Support sustainable fishing technologies.
4. **Research and Technology:**
   - Boost funding for **long-term studies**, **genetic analysis**, and **drone surveillance**.
   - Use **citizen science** and **traditional ecological knowledge** for better conservation data.
5. **Strengthen Legal Frameworks:**
   - Enforce **Wildlife Protection Act, 1972**, Schedule I.
   - Include dugong protection in **coastal regulation** and **marine spatial planning**.

UPSCMainsPractice Question

Ques: Dugongs are the silent gardeners of the sea but their existence is fading fast." Discuss the ecological importance of dugongs and the challenges in conserving them in India. (250 Words)

Page 07 : GS 3 : Environment

A **recent study published in** *Science* reveals that simple, low-cost operational improvements in brick kilns can **significantly reduce emissions** and **energy consumption**, especially in highly polluted countries like **Bangladesh**, and potentially across **South Asia**, including India.

The Problem: Brick Kilns and Pollution

- Bangladesh had the **second-worst air quality in 2024**, with PM2.5 levels **15 times higher** than WHO standards.
- **Brick kilns**, especially informal ones using outdated methods, are **major contributors to air pollution**.
- Emissions include **PM2.5**, **CO_2**, **SOx**, and **NOx**, impacting **public health**, **climate**, and **livelihoods**.
- Despite past efforts to reform kilns, success has been **limited due to poor compliance, lack of incentives**, and **informality**.

The Study: Key Interventions and Findings

- Conducted on **276 zigzag kilns** in Bangladesh — a type common across South Asia.
- Interventions focused on **heat retention** and **combustion efficiency**:
  - Continuous fuel feeding
  - Improved stacking of bricks
  - Thicker ash insulation
  - Cavity wall kiln gates
  - Use of **biomass powder** as complementary fuel

Key Outcomes:

- **23% less energy** used
- **20% drop** in **CO_2 and PM2.5 emissions**
- Better **brick quality**
- **Lower cost per brick**
- Adoption rate of **65%**, even without financial incentives
- **No rebound effect** (i.e., efficiency gains weren't nullified by increased use)

An excavator demolishes an illegal brick factory on the outskirts of Dhaka. AFP

Reducing heat loss in brick kilns also found to cut emissions

Priyali Prakash

Bangladesh is one of the most polluted countries in the world. According to an IQ Air assessment, the country had the second-worst air quality in 2024 worldwide, with PM2.5 concentration more than 15-times the World Health Organisation's suggested limit.

Brick kilns are a major contributor to this crisis. Previous efforts to improve the greenness of the local brick-making industry have resulted in limited success – but if a new study is to be believed, there is room for low-cost interventions to make a difference with these kilns.

The study, published in *Science* earlier this month, was conducted by researchers from the U.S., Bangladesh, and India. They performed a trial with 276 kilns in Bangladesh.

The proposed interventions were: single fireman continuous fuel feeding, improved brick stacking, a thicker ash layer on the kiln top, closing the kiln gate with a cavity wall, and complementary use of powdered biomass fuel. They had the same purpose: to improve fuel combustion and prevent loss of heat.

The study was performed on zigzag kilns, where the raw bricks are stacked in that shape to increase their exposure to hot air. This is the dominant type of informal brick kiln in Bangladesh.

The researchers found that there were no differences in the rates of adoption based on whether there were incentives beyond improving the kilns' operating

Researchers noted a 23% drop in energy use, a 20% drop in carbon dioxide and PM2.5 emissions, higher brick quality, and lower fuel cost per brick

efficiency. They also noted that the operators of most kilns were receptive to the interventions and that 65% of the kilns also adopted the recommended practices.

Among compliant kilns, researchers noted a 23% drop in energy use, a 20% drop in carbon dioxide and PM2.5 emissions, higher brick quality, and lower fuel cost per brick.

Evidence of how efficient energy-related interventions are has been inconsistent in the past. The new study has presented substantial proof that carefully designed operational improvements can also lead to significant energy savings. Notably, the savings noted in the study were achieved without rebound effects, which usually negate the benefit by increasing energy use elsewhere. The absence of these effects makes a stronger case for these interventions, the researchers said.

The lower emissions observed during the trial have important public health implications, especially for a country like Bangladesh. According to the researchers, if the project is scaled nationally and the interventions are adopted by all 6,352 zigzag kilns in Bangladesh, carbon dioxide emissions could be brought down by 2.4 million metric tonnes in a single brick-firing season – around 2% of the country's annual emissions.

The researchers also expressed belief that their interventions can be scaled up across Bangladesh as well as South Asia, a region with a significant air pollution problem. Regulating energy efficiency is particularly beneficial in parts of the region where air pollution has become a serious problem as well as where energy demand is increasing rapidly.

In these areas, state intervention has often proved an unreliable way to control emissions, especially in informal sectors.

(priyali.prakash@thehindu.co.in)

Broader Implications for South Asia and India:

- Brick kilns across **India, Nepal, and Pakistan** face similar pollution and energy challenges.
- **India** has a large informal kiln sector, especially in states like Uttar Pradesh, Bihar, West Bengal, and Rajasthan.
- Scaling similar interventions could lead to:
  - **Improved air quality**
  - **Reduction in GHG emissions**
  - **Health benefits** for urban and peri-urban populations
  - **Cost savings** for small and medium kiln operators
- **Regulation** in the informal sector remains weak, so **bottom-up operational improvements** may be more practical and scalable than **top-down mandates**.

Lessons for Governance and Sustainability:

- **Decentralized, evidence-based interventions** can outperform central regulation in informal sectors.
- **Public-private partnerships** and **community engagement** are vital.
- **Technology transfer** and **training programs** can help scale up sustainable practices.
- Important for India's goals under **National Clean Air Programme (NCAP)** and **climate targets (NDCs under Paris Agreement)**.

UPSC MainsPractice Question

Ques: Brick kilns are a significant contributor to air pollution in South Asia. Examine how low-cost operational improvements can aid in reducing emissions from this informal sector. What lessons does this offer for India's environmental policy? **(250 words)**

Page 08: GS 2 : Governance

Despite significant growth in power generation and the rapid integration of renewable energy, **India is facing rising peak power demand** and energy deficits, which widened from **0.69% in FY20 to about 5% in FY24**. This exposes a supply constraint and underscores the urgent need for **energy efficiency** as a solution for managing demand and ensuring climate sustainability.

Why Energy Efficiency is Crucial:

1. **Quick and Low-Cost Solution:** Compared to building new power infrastructure, **improving energy efficiency** is the **fastest and most economical way** to reduce energy demand and emissions.
2. **Power Demand Spike:** India's **peak power demand touched 250 GW** in 2024. Rising urbanisation and **increased cooling needs** due to climate change are key contributors.
3. **Climate Impact:** India is the **third-largest energy consumer** globally. Over **70% of energy** still comes from **coal**, and **90 GW of new coal capacity** is planned by 2032. Efficiency can counteract this carbon-heavy trajectory.

Success of UJALA and Related Schemes:

- **UJALA (Unnat Jyoti by Affordable LEDs for All):**
  - Reduced **LED bulb prices** from ₹500 to ₹70.
  - Distributed **37 crore bulbs**, enabled sale of **407 crore bulbs**.
  - Helped **save $10 billion**, and avoided construction of **9,500 MW of power capacity**.
- **Street Lighting National Programme:**
  - Installed **1.34 crore LED street lamps**.
  - **Reduced peak demand by 1,500 MW**.
- LED bulbs consume **~90% less power** than incandescent bulbs, leading to substantial household and national energy savings.

Broader Policy Context:

Energy and efficiency

India must reduce its power consumption by increasing efficiency

Despite robust growth in electricity generation over the past two decades, with rapid additions of renewable energy in the past five years, India has been unable to meet its peak power demand, with the deficit widening from 0.69% in FY20 to about 5% in FY24. This reveals constraints in the supply of power – new power production is time consuming, especially if fossil-fuel based, even as India attempts to integrate renewable power into the power grid. Therefore, India must focus on enhancing energy efficiency holistically to reduce power demand, also the quickest and least expensive way to address rising power demand and climate change. This year marks a decade of India's groundbreaking energy efficiency scheme, UJALA, which has helped bring down the price of energy efficient light emitting diode (LED) bulbs from about ₹500 a decade ago to ₹70, enabling its widespread home use. The scheme succeeded as another public energy efficiency measure was baked into the initiative – the Street Lighting National Programme, which led to the installation of over 1.34 crore LED lamps across urban local bodies and gram panchayats, and reducing peak demand by over 1,500 MW. As of January 2025, the government has distributed about 37 crore LED bulbs and enabled the sale of about 407 crore more.

LED bulbs consume half the amount of power of compact fluorescent lamps, while incandescent light bulbs require nine times the power that LEDs consume, translating into considerable cost savings for Indian homes. But estimates also suggest that the UJALA scheme alone has helped India save over $10 billion and avoided building over 9,500 MW of new generation capacity, which is the equivalent of 19 new coal-fired 500 MW power plants. Indeed, there are other energy efficiency measures that India has taken following the enactment of the Energy Conservation Act, 2001. The International Energy Agency states that between 2000 and 2018, energy efficiency improvements enabled India to avoid an additional 15% of energy demand and 300Mt of CO_2 emissions. But with India's rapid urbanisation in the past two decades and rising per capita energy consumption to meet cooling needs as summers get hotter, peak power demand reached 250 GW last year. India is today the third largest power consumer globally, after China and the United States. Moreover, 70% of its energy output continues to be from coal and India has plans to add another 90 GW of coal-based capacity by 2032. What is needed now is greater energy efficiency mandates across sectors such as buildings, home appliances and the country's sprawling MSMEs.

- **Energy Conservation Act, 2001:**Provides the legal framework for energy efficiency mandates.
- **International Energy Agency (IEA)**:Between 2000–2018, India avoided **15% additional energy demand** and **300 Mt of CO_2 emissions** through energy efficiency.
- **Need for Expansion:**
  - Focus on **buildings, appliances, and MSMEs**.
  - Mandatory **energy codes for buildings**.
  - Incentives for energy-efficient appliances and retrofitting in industries.
  - **Behavioral changes** and awareness campaigns.

UPSC Mains Practice Question

Ques: India's energy future lies not just in building new capacity but in using existing power more wisely." Critically analyse the role of energy efficiency in addressing India's power demand and climate goals. (**250 words)**

Page : 08 Editorial Analysis

The silver jubilee of a strategic partnership

Philipp Ackerman

is the German Ambassador to India

The German-India partnership is a multifaceted one that has evolved steadily; there is much optimism about what is lies ahead

This month, India and Germany celebrate 25 years of strategic partnership. It is a partnership that has steadily evolved and is well equipped to take on the challenges of today's world. Germany's 'Focus on India' strategy outlines our vision for the future of the bilateral partnership. The new German Coalition Treaty, as well as early phone calls between German Chancellor Friedrich Merz and Prime Minister Narendra Modi as well as German Foreign Minister Johann Wadephul with his Indian counterpart S. Jaishankar speak a clear language – we will continue to build on this partnership, and to closely coordinate with our Indian partners.

Our ties are multifaceted, but essentially stand on four pillars – peace, prosperity, people and the future of our planet.

A shared vision

Peace and stability are fundamental prerequisites for the development of our countries. India and Germany share a vision of a peaceful, stable and rules-based world. At the core of our trusted political relationship is a unique format: The Intergovernmental Government Consultations build a strong bridge between our government that solidifies and channels our ties in a comprehensive, productive and purposeful way. An area that has particularly thrived over the last years is our cooperation in the defence sector. I remember vividly standing on the hot tarmac at the Sulur Air Force station (Coimbatore, Tamil Nadu) during the Tarang Shakti Exercise (2024), witnessing the incredible air show of Indian and German pilots whizzing through the air with great skill, coordination and teamwork. These joint military exercises and port calls by the German Navy anchor the Indo-Pacific in the German geostrategic mental map. In the future, we can expect closer strategic cooperation, and closer ties between our defence industries.

Prosperity means more than just economic growth. In a more comprehensive sense, it allows our people to flourish, to find meaningful jobs, and to provide their families with the means for a better future. Around 2,000 German companies are active in India, and they create more than 750,000 jobs for Indians.

One of my most memorable moments in Delhi was visiting the Delhi-Meerut Rapid Rail. These are high-tech trains on great infrastructure, operated by young, talented Indians in the uniforms of Deutsche Bahn, our national railway company, which runs the operations in Delhi. A growing number of Indian companies are also present in Germany, increasingly integrated into our high-tech supply lines.

In times of unprecedented global trade disruptions, these closely integrated supply lines testify to the trust that we place in each other. And this could be just the beginning, as a free trade agreement between India and the European Union – two of the global economic powerhouses – becomes tangible. Science and technology are another part of the prosperity equation. We do ambitious research together, and you will find Indian researchers in our top scientific institutions. With tech cooperation, we can transform environmental challenges into business cases.

People-to-people ties

People fill our strategic partnership with life and stories. A growing number of Indians now call Germany their home. Over 50,000 Indians study in our country – by now the largest group of foreign students at German universities. Some of them spend a few years in Germany, get their first jobs, gain technical experience, earn good money. Many of them then return to India to build their families there. Some Indians also stay in Germany and see their children grow up in our country. Either way, they deepen and enrich our ties. Many young Indians showcase their life in Germany online. I have met many of them in person and listened to their stories. I am always impressed by this uniquely Indian ability to make a new place a home. I see young Indians adapting, thriving, and making their contribution to German society and economy. Germany offers many opportunities to young, ambitious and gifted Indians, but more doors will open to those who learn German.

I witness a great interest in our language all across India and we will have to explore new ways together to match well-equipped German teachers with every interested Indian. The second hurdle is in getting more Germans to study and to work in India. We need more people who understand the story of India, more people who speak one of the many fascinating languages of India, and more people who settle down there to set up shop. Any investment in the younger German and Indian generations will be an investment in the people that will propel our strategic partnership to new heights in the next 25 years.

Green development

Our partnership on the challenges and the future of our planet is one of the most important one: Planet earth is our common ecological lifeline, it future-proofs our livelihoods. In 2022, Germany committed €10 billion in preferential loans and grants for India, over a span of 10 years. This is what we call the Indo-German Green and Sustainable Development Partnership (GSDP). We cooperate with our Indian friends on a large scale on renewables, on biodiversity and on smart city projects. In addition to that, private sector cooperation in this area is also noteworthy. Recently, I visited renewable energy projects in Gujarat, whose scale and ambition are just astonishing – solar panels and windmills in all directions. The rotor blades of the wind turbines are partly produced by a German company – with our technology, we want to be a part of India's energy transition, and of the fast-paced economy of this country.

I have had the privilege of serving in India twice – between 2007 and 2010 – and as Ambassador since 2022. In these years, India has developed in the most impressive way. And so has our strategic partnership. Looking back at what we have achieved together fills me with a sense of accomplishment, and with great optimism for what is yet to come.

Paper 02:International Relations

UPSC Mains Practice Question:India and Germany share a robust strategic partnership based on shared democratic values, economic cooperation, and sustainable development. Evaluate the strengths and opportunities in this relationship in light of recent developments. (250 words)

Context :

May 2025 marks **25 years of strategic partnership** between **India and Germany**. The bilateral relationship, founded on shared values and global cooperation, is increasingly being reshaped by geoeconomics, climate commitments, and people-to-people ties. The recent reflections of German Ambassador Philipp Ackerman highlight how this partnership has matured and where it is heading.

Key Pillars of the India-Germany Strategic Partnership:

1. Peace and Stability (Political-Strategic):

- Both nations support a **rules-based international order** and multilateralism.
- Regular **Intergovernmental Consultations (IGC)** serve as a strong diplomatic platform for joint decision-making.
- **Defence cooperation** is growing — joint military exercises like *Tarang Shakti*, naval port calls, and scope for industrial collaboration in the defence sector underscore strategic depth.
- Germany's increased involvement in the **Indo-Pacific** reflects India's growing strategic importance in European foreign policy thinking.

2. Prosperity and Economic Collaboration:

- Over **2,000 German firms in India**, creating **750,000+ jobs**.
- German participation in infrastructure projects like **Delhi-Meerut RRTS** shows trust and integration.
- India-EU **Free Trade Agreement** (FTA) under negotiation; Germany is a key advocate within the EU.
- **Science, technology, and research** partnerships are robust, with Indian scholars in German labs and vice versa.
- Business cooperation is expanding into **renewables, AI, biotech, and green manufacturing**.

3. People-to-People and Cultural Ties:

- Over **50,000 Indian students in Germany**, the largest foreign student group.
- Increasing **diaspora integration**: from students and tech professionals to entrepreneurs and families.
- Mutual interest in language and cultural exchange (e.g., Goethe Institutes in India and growing demand for German language).
- Need for **more Germans to study and work in India** to balance the cultural exchange.

4. Future of the Planet (Green Development Partnership):

- Indo-German **Green and Sustainable Development Partnership (GSDP)**: €10 billion committed over 10 years.
- Collaboration on **renewable energy, biodiversity, sustainable urban development**, and **climate financing**.
- Technology transfers in solar, wind, and smart grid projects with German firms contributing to India's energy transition (e.g., wind turbine blades made with German input in Gujarat).
- Germany aims to be a **long-term partner in India's green growth strategy**.

Significance of the Partnership:

- Strengthens **India's strategic autonomy** by diversifying its partnerships beyond traditional alliances.
- Offers a **model for sustainable and equitable development**, combining technology, capital, and shared democratic values.
- Enhances **India's profile in Europe**, while helping Germany diversify its strategic interests beyond the West.

Conclusion:

The 25th anniversary of the India-Germany strategic partnership marks not just a milestone of diplomatic longevity but also a moment of renewed ambition. Anchored in **shared values of democracy, peace, and multilateralism**, the partnership has matured into a **comprehensive engagement** across defence, economy, education, sustainability, and cultural exchange.

As both countries navigate a world marked by climate urgency, technological disruption, and shifting geopolitics, the **Indo-German collaboration offers a model of balanced, future-oriented diplomacy**. Going forward, investing in **people-to-people ties, green technology, defence cooperation**, and **economic resilience** will be crucial to harnessing the full potential of this partnership for the next 25 years — and beyond.