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### 1. How a beam of sunlight was directed on Lord Ram's forehead in Ayodhya temple



#### Why in News?

A three-minute-long Surya Tilak ceremony — where a beam of sunlight was projected onto the forehead of Lord Ram's idol in Ayodhya's newly-built Ram temple, marking the occasion of Ram Navami.

This was achieved using a special mirror-lens arrangement, designed by astronomers at the Indian Institute of Astrophysics (IIA), Bengaluru, that has been installed in the building by a team from

the Central Building Research Institute, Roorkee.

#### What is the science behind Ram Lalla's Surya Tilak.

##### Step 1: Predict the Sun's position (each year)

When following the Gregorian calendar, the date of Ram Navami (the Hindu festival celebrating the birth of Lord Ram) varies each year. This is because the Gregorian calendar is a solar calendar (based on Earth's revolution around the Sun — one revolution equals to one year), while the Hindu calendar is a lunar calendar (based on the Moon's revolution around Earth — one revolution equals to one month). A solar year has roughly 365 days, whereas a lunar year is roughly 354 days long.

Given that the IIA team's brief was to channelise the sun's rays such that they fall on the Ram idol's forehead on Ram Navami, its first task was to calculate the position of the Sun in the sky on that day in any given year.

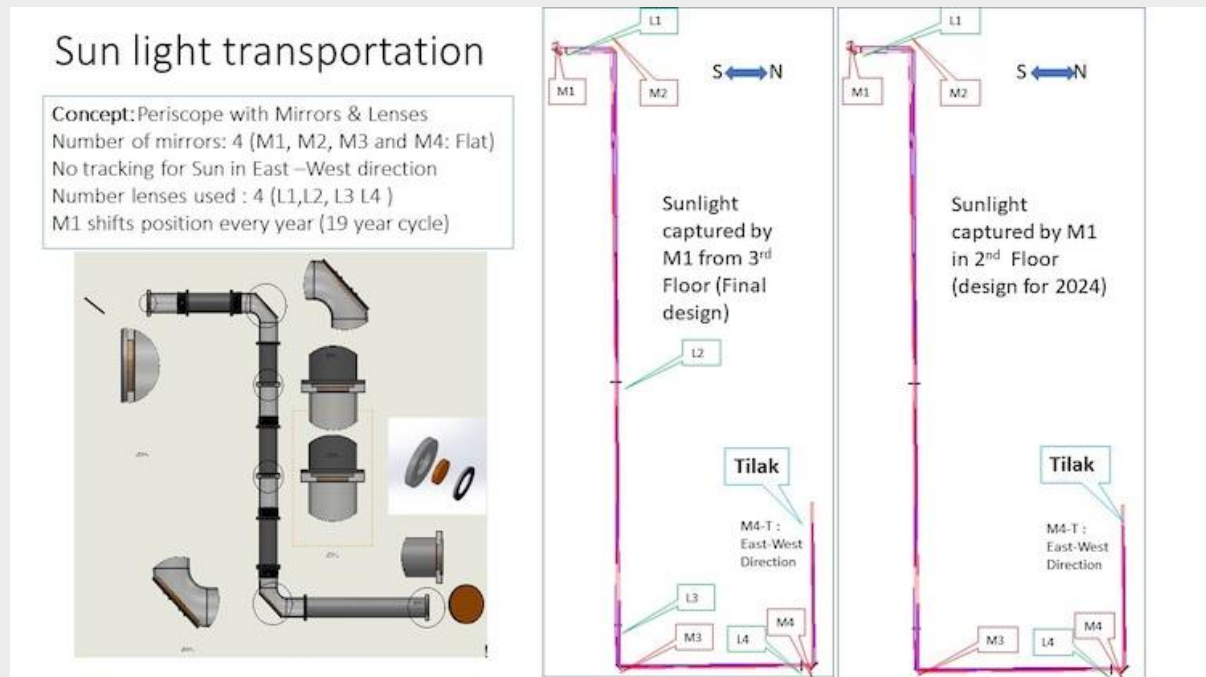
##### Step 2: To channelise the Sun's rays

After astronomers estimated where the Sun will be in the sky, their second task was to channelise the sunbeam "in a manner that it will fall on the idol's forehead for a certain amount of time.

The IIA team, which began designing the apparatus three years ago, proposed a four-mirror-and-four-lens array for this purpose. The first mirror, responsible for receiving the sunlight, has to be positioned at an angle along the path of the sun rays.

The light will then be reflected to three other mirrors, and will pass through four lenses until it is of the desired intensity, and will be directed to the idol's forehead. The mirrors directed the beams while the lenses made them converge to the required intensity.

Given that the sun's position vis-à-vis the first mirror will vary each year, a specially designed 19-gear system was built to make requisite adjustments.



How the system works

The number 19 was chosen to correspond to the Metonic cycle — a period of 19 years in which there are 235 lunar months, after which the Moon's phases recur on the same days of the solar year. This means that every 19 years, the system will effectively reset, and the cycle will then begin again.

### Not the final setup

The glass tube set-up, housing the lenses and mirrors, runs from the third floor of the temple, all the way to the sanctum sanctorum. This huge set-up requires precision handling, and a clean environment to operate. The IIA team was especially concerned about the final mirror positioned inside the sanctum sanctorum, where general activity and havans can lead to soot and dust gathering.

Since the construction of the temple is yet to be complete, the installation of the final system has not yet taken place. For the temple's first Ram Navami celebration, a modified version of the system, having four mirrors and two lenses, was deployed from the second floor of the temple building.

Relevance: GS Prelims; Science

Source: Indian express

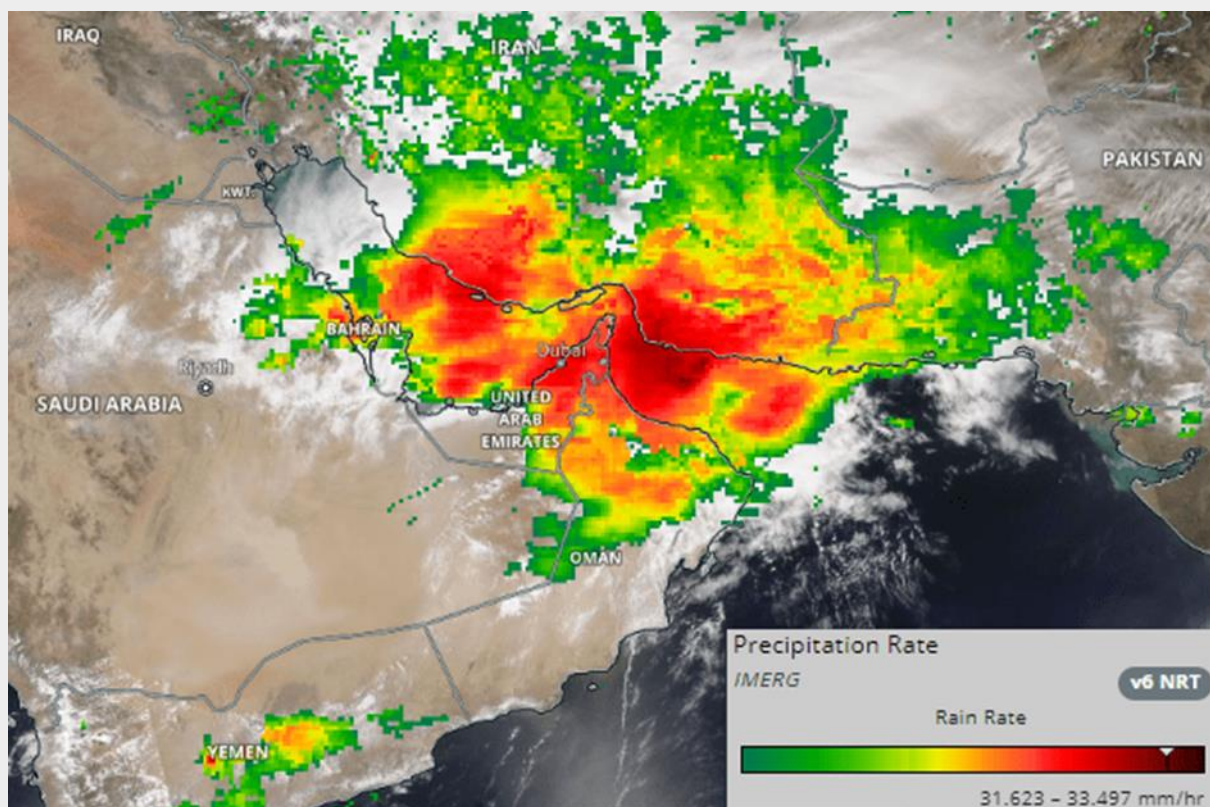
## 2. What's behind heavy rainfall in Dubai

### Why in News?

The United Arab Emirates (UAE) recorded the heaviest rain ever after a severe thunderstorm hit the country on April 15 late night, killing at least one person, causing damage to homes and businesses, and bringing air travel to a standstill in Dubai.

According to the state-run news agency, the rain was “a historic weather event” that surpassed “anything documented since the start of data collection in 1949” — that was before the UAE was established in 1971.

Heavy rains are unusual in the UAE, which is an arid, Arabian Peninsula country. However, they occasionally occur in the region during cooler winter months.



### **What happened?**

The thunderstorms had dumped more than 142 millimetres (mm) of rain onto the desert city of Dubai in less than 24 hours. Usually, the city witnesses this much rain in a year and a half. An average year sees 94.7 millimetres of rain at Dubai International Airport — the world’s second busiest airport, which recorded more than 80 million visitors in 2023.

Across Dubai, homes were flooded and vehicles were abandoned on roadways. Popular shopping centres like Dubai Mall and Mall of the Emirates were also flooded. Tanker trucks were sent onto the streets and highways to pump out the water.

### **What led to the heavy rains?**

The primary reason for these heavy rains was a storm system, which was passing through the Arabian peninsula and moving across the Gulf of Oman.

According to a different report by the AP, rains could have been exacerbated by cloud seeding, a process of spraying salt mixtures in clouds that would result in condensation of the cloud and eventually cause rainfall.

### **Is climate change responsible for the event?**

Some experts have suggested that the soaring global temperatures could also be behind the event. Higher temperatures cause evaporation of water not only from land but also oceans and other water bodies, meaning a warmer atmosphere holds more moisture. Studies have found that for every 1 degree Celsius rise in average temperature, the atmosphere can hold about 7% more moisture. This makes storms more dangerous as it leads to an increase in precipitation intensity, duration and/or frequency, which ultimately can cause severe flooding.

Studies based in India's Thar desert and Australia's desert regions have shown that climate change could lead to more rainfall in these areas.

While the average global temperature on the Earth has increased by at least 1.1 degree Celsius since 1850, the UAE has witnessed an increase of almost 1.5 degree Celsius in the past 60 years. The increase in temperatures is mainly caused by the rise of heat-trapping greenhouse gas (GHG) emissions since the Industrial Revolution.

However, it is extremely difficult to attribute any particular extreme weather event to climate change. It is because there are multiple factors, like patterns of natural climate variability, such as El Niño and La Niña, that contribute to such events.

Relevance: GS Prelims & Mains Paper III; Environment

Source: Indian Express

### **3. Anti-Maoist operations status report: What is the significance of Apr 16 encounter?**

#### **Why in News?**

At least 29 Maoists were killed in a gunfight with security forces deep in the forests of Kanker district in southern Chhattisgarh on April 16.

The operation is among the biggest successes for security forces in a single operation against Maoists. What does it say about the current status and nature of the Maoist challenge in Chhattisgarh and the country as a whole?

#### **In what ways is this encounter significant for the security forces?**

The successful operation marks the entry of security forces inside Abujmad, a vast swathe of forest land in the geographical heart of India. A security vacuum has persisted in Abujmad for more than three decades now, allowing the Maoists to make this sprawling area into an almost impenetrable stronghold.

At an operational level, this encounter has ensured that the Maoists' Partapur area committee, which has been accused of carrying out several deadly attacks on both security forces and civilians, including the killing of a BSF jawan in an improvised explosive device (IED) blast



during the Chhattisgarh Assembly elections last year and the blowing up of vehicles deployed to build roads in the area, has been all but wiped out.

### What is the significance of the area in which this operation took place?

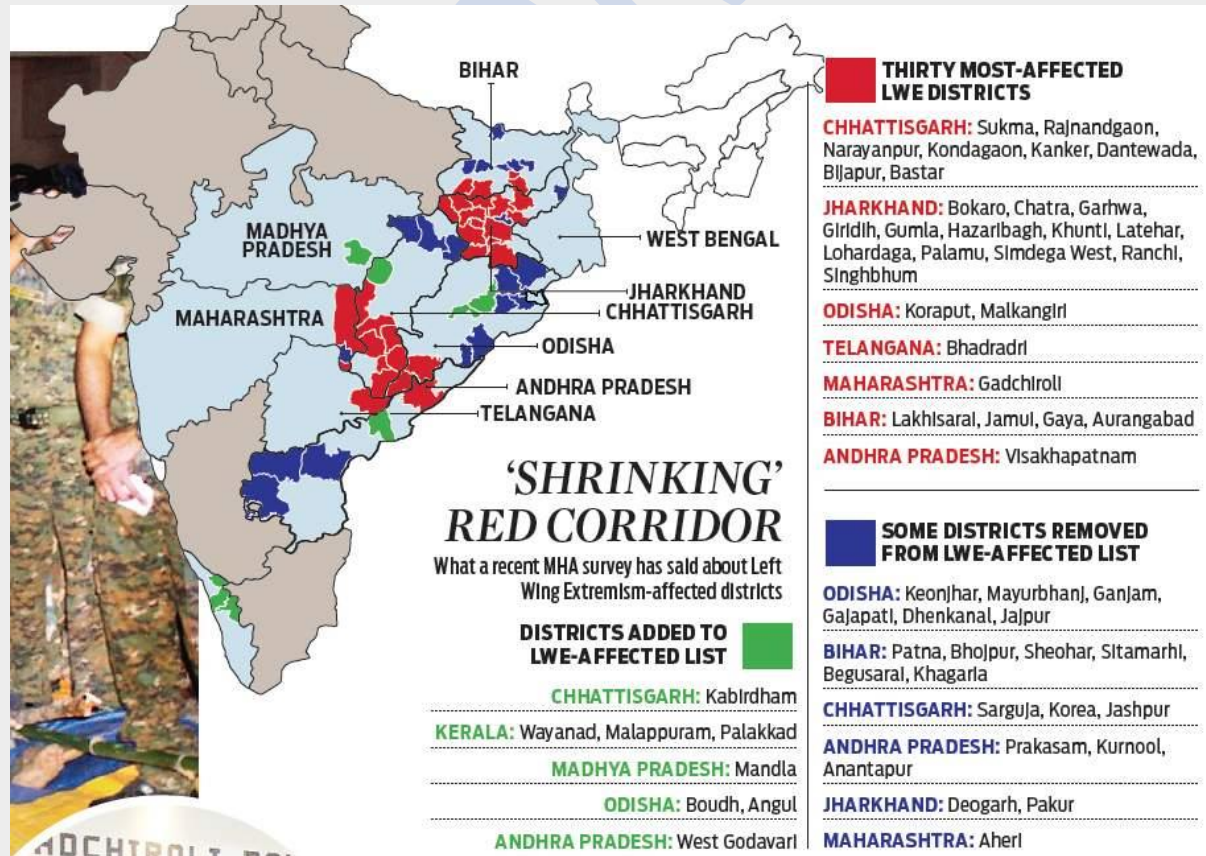
The hills and forests of Abujhmad, literally the “unknown hills”, sprawl over an area of about 4,000 sq km in the Bastar region of southern Chhattisgarh, mainly covering the districts of Narayanpur, Bijapur, and Dantewada, immediately to the south of Kanker.

The difficult terrain, the absence of road infrastructure, and presence of the armed rebels has ensured that 90% of this area that is bigger in size than the state of Goa, remains unsurveyed by the government.

These jungles, including parts of the Indravati National Park in Bijapur district, are used both as a safe haven and a transit corridor by Maoists to travel between Maharashtra (to the west), Andhra Pradesh (to the south), Telangana (to the southwest), and Odisha (to the east) via Chhattisgarh’s Sukma district.

### What is the nature and magnitude of the Maoist threat currently in Chhattisgarh?

Since the BJP came to power in the state last year, a few new police camps have been set up on the two main entry points to Abujhmad, from Kanker in the north and Narayanpur in the east. Police have also crossed the Kotri river, a tributary of the Indravati-Godavari, and established a base camp in Abujhmad. This made the present operation possible, an official said.



According to a PTI report quoting data from the Home Ministry, the number of Left Wing Extremism (LWE) affected districts was 38 as of March 2024. The highest number of LWE-affected districts are in Chhattisgarh (15), followed by Odisha (7), Jharkhand (5), Madhya Pradesh (3), Kerala, Telangana, and Maharashtra (2 each), and West Bengal and Andhra Pradesh (1 each).

**What does Tuesday's successful operation signal for the anti-Naxal strategy of the security forces going forward?**

Two of the Bastar region's biggest encounters against Maoists since 2006 have taken place this month. Before recent encounter in Kanker, 13 alleged Maoists were killed in Bijapur district on April 1. A total 79 Maoists have been killed so far this year; in 2019, 65 Maoists were killed in the entire year.

**And what does the success of the operation mean for the Maoists in this region?**

The security forces have sought to send a clear message to the rebels: give up your weapons and surrender, or be prepared to be killed. That said, the Maoists still control a large area, and retain the capability and ammunition to launch a big attack.

Relevance: GS Prelims & Mains Paper III; Internal Security

Source: Indian Express