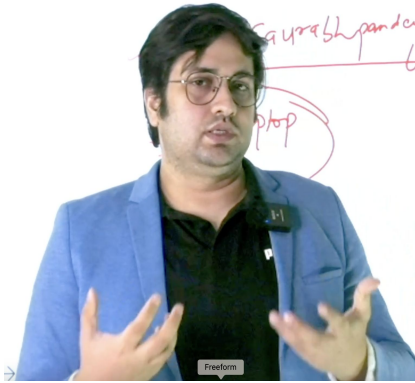
Topics - MINDS MAPS included (Daily current affairs 20th Feb 2025

- The Science Behind Polarised Moonlight
- violence around Milky Way's central black hole
- The Humanitarian Crisis in the India-Myanmar Borderlands
- Disaster Resilient Infrastructure (CDRI) Report
- Mains



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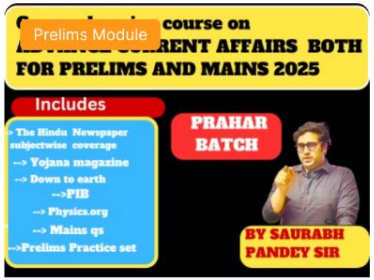

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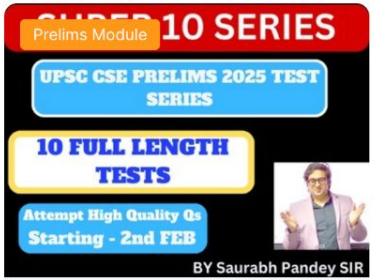

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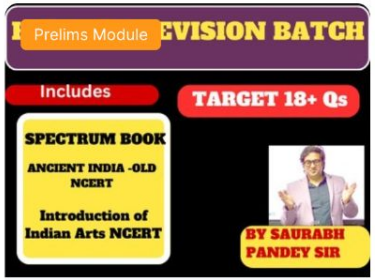

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Only second animal to find its way by polarised moonlight found

The way the polarisation patterns of sunlight and moonlight are oriented in the sky allows animals to use it as a compass. Nocturnal bull ants were able to detect polarised moonlight throughout the lunar cycle for foraging, even under a crescent moon when the moonlight is 80% less intense

Madhurima Pattanayak

Many nocturnal animals, including insects such as ants and bees, follow the moon's position to find their way when they go foraging. But the moon waxes and wanes in a cycle and can be obscured by clouds or overhanging tree canopies, so the animals cannot always directly track its position.

Now, for the first time, scientists at Macquarie University, Sydney, have found that two nocturnal bull ant species (*Myrmecia pyriformis* and *Myrmecia midas*) make their way at night with the help of polarised moonlight, which, while being dimmer even than moonlight, contains unusual patterns that can point the way.

This is also only the second instance of an animal being found to use polarised moonlight to orient itself.

Returning late

Seen from the ground, both sunlight and moonlight contain characteristic polarisation patterns. The way these patterns are oriented in the sky, rather than the location of the light source alone, allows animals to use it as a compass.

The study found the nocturnal bull ants were able to detect and use polarised moonlight throughout the lunar cycle for foraging, even under a crescent moon when moonlight is 80% less intense.

The polarisation patterns in moonlight are also a million-times dimmer than in sunlight. So while many animals are known to use the latter, very few use the former. The first animal found to use polarised moonlight was the dung beetle.

Scientists already knew *M. pyriformis* and *M. midas* ants used polarised sunlight to navigate, but this light fades as the sun sets. The study's researchers were also aware most of the foraging *M. midas* ants returned overnight while the night-time activity of *M. pyriformis* ants increased on full-moon nights.

The e-vector pattern

The sun and the moon both emit unpolarised light. Light is an electromagnetic wave, with the electric field oscillating perpendicular to the magnetic field, and both fields oscillating perpendicular to the wave's direction of motion.

When the light moves through the earth's atmosphere, it is scattered by particles in the air and becomes polarised. Polarisation denotes a specific orientation of the electric field.

Both sunlight and moonlight scattered in the atmosphere become linearly polarised, meaning the electric field oscillates in a single, fixed plane perpendicular to the wave's motion. The scattered light is also oriented 90° to the incident light.

As numerous light waves are scattered in this way, an unusual pattern emerges in the sky when seen through a filter that can detect polarised light. This is called the e-vector pattern.

"[W]hen the sun/moon is near the horizon, the pattern of polarised skylight is particularly simple, with uniform direction of polarisation approximately parallel to the north-south axes," the researchers wrote in their paper.

The stability of this pattern gives an animal that can detect it a natural compass.

A close-up view of a *Myrmecia pyriformis* ant. Before the present study, scientists already knew *M. pyriformis* ants used polarised sunlight to navigate, but this light fades as the sun sets. PATRICK KAVANAGH/FLICKR (CC BY)

Under the moon

The researchers created linearly polarised light and cast it on a population of nocturnal bull ants in the wild, then tracked the ants' ability to orient themselves relative to their two nests, located more than 50 metres apart.

Under full, waxing, and waning moon conditions, the researchers rotated their polariser clockwise by 45° and later counterclockwise by 45°. In each instance, the e-vector of the light falling on the ants changed. The ants responded by adjusting their path to the left and later to the right. Once the foragers crossed the area where the researchers' light was being cast, they adjusted once more to reorient themselves according to the e-vector pattern in the sky.

The researchers used paired tests to compare the magnitude of these shifts between the initial orientation and the filter exit and again between the filter exit and the reorientation. The paired tests are a statistical tool with which researchers can determine whether paired observations – shift magnitudes in this case – differ between two samples.

"Shift magnitude is the number of degrees the ants alter their headings under the filter," Cody Freas, a doctoral student at Macquarie University and one of the study's coauthors, said.

While the nocturnal bull ants were found to use polarised moonlight throughout the lunar cycle, their heading shift magnitudes dropped during the waning phases. The researchers called this finding "unexpected". Likewise, foraging ants had substantially higher

> The sun and the moon both emit unpolarised light. When the light moves through the atmosphere, it is scattered by particles in the air and becomes polarised. Polarisation denotes a specific orientation of the electric field

shift magnitudes during the waxing full moon and waxing quarter moon phases compared to the waning phases.

Under the new moon, when the ambient moonlight e-vector disappeared, the paths of the foraging ants did not change significantly when the polarisation filter was rotated in either direction. The ants also didn't reorient their paths to a meaningful degree once they exited the filter.

The researchers used another statistical test to compare the differences in shift magnitudes when the filter was rotated clockwise and counter-clockwise across lunar phases.

Shift magnitudes, vector distances

During the full moon, when moonlight reaches 80% of its maximum intensity, the shift magnitudes were 36.6° to 43° at Nest 1 and 21.5° to 28.9° at Nest 2. According to Freas, the difference between the two nests is likely due to the long distance that foragers at Nest 1 traversed on their trip to the foraging tree, 6 m, versus 2.5 m from Nest 2.

"At short vector lengths, like at Nest 2, the vector, which is informed by the sky compass, becomes less reliable," he said, adding that the longer the distance, the more "powerful" the guidance is.

"Thus, if the ant walks 6 m to the foraging tree, we can say that the ant has a 6-m vector pointing back to the nest. This vector also [shrinks] as the ant travels in the nest direction. It's an updating estimate of how far away the nest is at any point. So when we release an ant halfway home, it still has the vector from where it was captured (6 m)."

According to Clarke Scholtz, emeritus professor of entomology at the University of Pretoria, South Africa, and Marie Dacke, a professor of sensory biology at Lund University, Sweden, "The methods used in the study are appropriate." Neither was involved in the study.

"While we cannot compare solar and moonlight polarisation navigation in outbound ants ..., striking similarities occur when comparing solar and moonlight polarisation navigation in ants homing to the nest," the researchers wrote in their paper.

"... it remains unknown if these ants are tracking their lunar polarisation compass by using a time-compensated lunar compass, or if the compass is updated with reference to other cues, such as the panorama, throughout the night," they added. Honeybees and desert ants have been known to use such cues together with sunlight. They said future research could check whether the ants have a way to say where the moon is after specific intervals by "exposing or blocking access to the sky and familiar panorama for set time periods when the moon is naturally visible overnight...".

(Madhurima Pattanayak is a freelance science writer and journalist based in Kolkata. madhurima.pattanayak@gmail.com)

Topic → The Science Behind Polarised Moonlight

How Does It Work?

Both sunlight and moonlight exhibit unique polarisation patterns.
Instead of relying solely on the light source's position, these patterns serve as a compass for nocturnal animals.
The study found that bull ants could detect and utilize polarised moonlight throughout the lunar cycle, even under weaker crescent moonlight.

Adaptation and Survival: The Role of Polarised Light

- Polarised moonlight is approximately a million times dimmer than sunlight.
- Despite its faintness, this light provides essential navigational cues for certain species.
- The dung beetle was the first known animal to employ polarised moonlight, making the bull ants' discovery a significant addition to this fascinating phenomenon.

Returning Home: Behavioral Insights

Nocturnal Activities

Myrmecia midas ants typically return to their nests overnight.
Myrmecia pyriformis ants exhibit heightened activity on full-moon nights, capitalizing on increased visibility.

These findings not only highlight the adaptability of these ants but also underscore the intricate relationship between light and life.

Polarized & Unpolarised Light

☀️ **Unpolarised Light:** The sun and moon emit unpolarised light, which becomes polarised when scattered by atmospheric particles.

🌌 **E-Vector Pattern:** The scattered light creates a unique e-vector pattern in the sky, particularly simple when the sun or moon is near the horizon, aligning with the north-south axes.

🐜 **Ant Orientation:** Nocturnal bull ants can detect this polarised light and use it as a natural compass to orient themselves between their nests.

🔄 **Experimental Method:** Researchers manipulated the e-vector of light and observed the ants' directional adjustments in response to changes in polarisation.

📉 **Shift Magnitudes:** Ants showed varying shift magnitudes in their headings based on lunar phases, with significant shifts during waxing phases and minimal shifts during the new moon.

📊 **Statistical Analysis:** Paired tests were employed to analyze the differences in shift magnitudes, revealing unexpected patterns in the ants' navigation behavior.

🌙 **Lunar Influence:** The study found that the ability of ants to use polarised moonlight for navigation decreased during the waning phases of the moon.

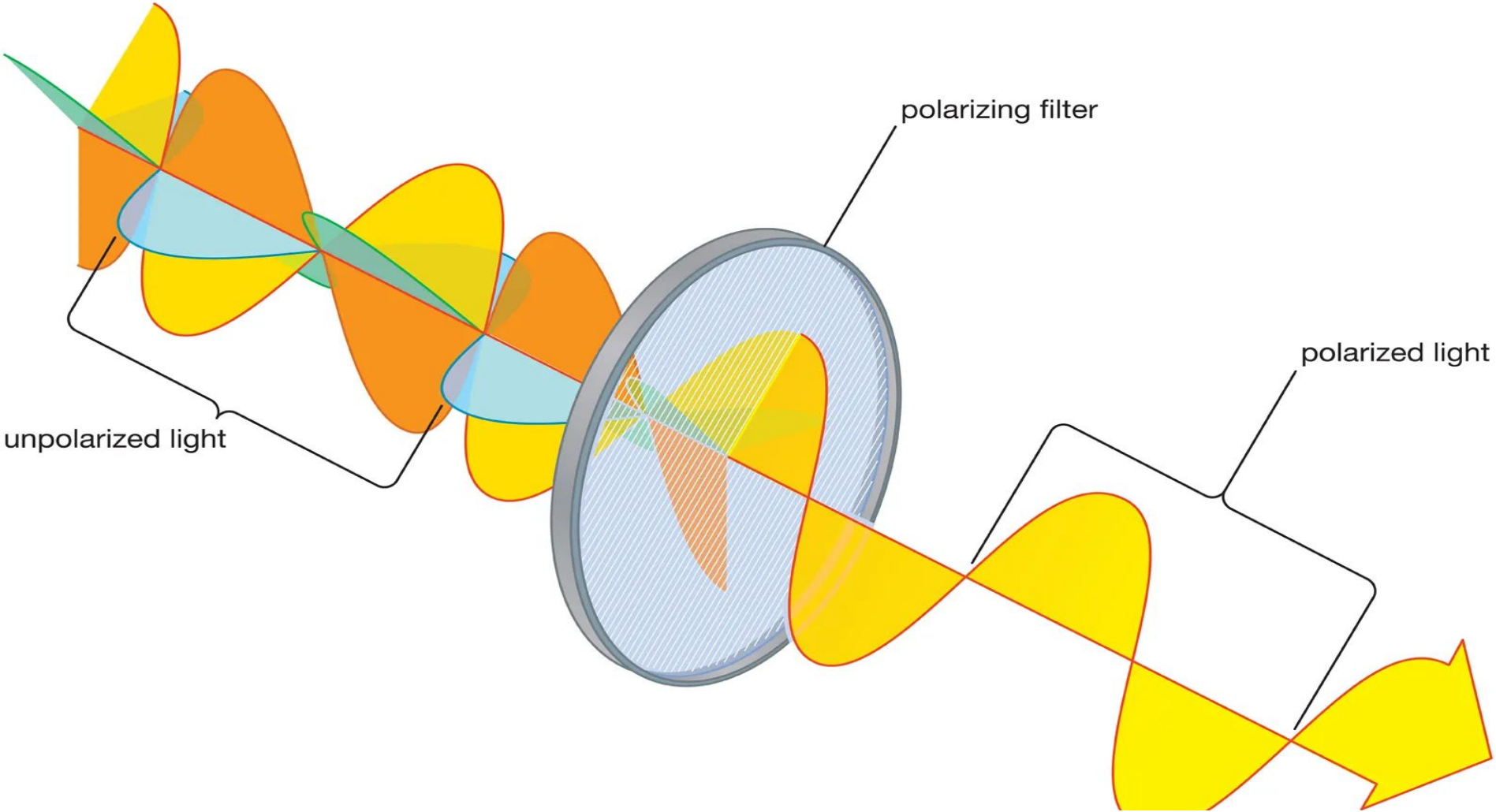
Summary: The study reveals how nocturnal bull ants utilize polarised moonlight for navigation, demonstrating significant variations in their orientation behavior across different lunar phases

Unpolarized light is light with a random polarization that changes over time. This means that the direction of the electric field of the light fluctuates randomly.

How is unpolarized light produced?

- Unpolarized light is produced by many atoms or molecules that emit light independently.
- The emissions of these atoms or molecules are uncorrelated.
- The sum of the randomly oriented wave trains results in unpolarized light.
-

Examples of unpolarized light Sunlight, Halogen lighting, LED spotlights, Incandescent bulbs, and Flames.


polarizing filter
polarized light
unpolarized light

FAQs

What is polarised moonlight?

Polarised moonlight refers to the unique arrangement of light waves that can provide navigational cues to certain animals.

Which animals have been found to use polarised moonlight?

Currently, the only known animals using polarised moonlight for navigation include certain bull ants and dung beetles.

How do these ants navigate at night?

They utilize the polarised patterns in moonlight as a compass, allowing them to find their way even when the moon is partially obscured.

What is the significance of this discovery?

This finding enhances our understanding of animal navigation and the potential for other species to use similar mechanisms.

Are there other nocturnal animals that navigate using light?

Many nocturnal animals utilize various light sources, but few have been documented using polarised moonlight specifically.

An artist's concept of Sagittarius A*, surrounded by a swirling accretion disk of hot gas. REUTERS

Glimpses of violence around Milky Way's central black hole

Reuters

NASA's James Webb Space Telescope is providing the best look yet at the chaotic events unfolding around the supermassive black hole at the center of our Milky Way galaxy, observing a steady flickering of light punctuated by occasional bright flares as material is drawn inward by its enormous gravitational pull.

Webb was launched in 2021 and began collecting data in 2022, allowing astronomers to observe the region around the black hole, called Sagittarius (Sgr) A*, for extended periods for the first time.

The region around Sgr A* was seen as bubbling with activity rather than remaining in a steady state. In particular, the researchers observed a constant flickering of light from the swirling disk of gas surrounding the black hole, called an accretion disk. This flickering appears to be emanating from material very close to the event horizon, the point of no return beyond which everything is dragged into oblivion.

There were also one to three large flares over any 24-hour period with smaller bursts in between.

"The accretion disk is a very chaotic region filled with turbulence, and the gas gets even more chaotic and compressed as it approaches the black hole, under extreme gravity," said astrophysicist Farhad Yusef-Zadeh of Northwestern University in Illinois, lead author of the study published on February 18 in the astrophysical journal *Letters*.

"Blobs of gas are bumping into one another and, in some cases, being forced or compressed together by the strong magnetic fields that exist within the disk, somewhat similar to what happens in solar flares," said astrophysicist and study co-author Howard Bushouse of the Space

Researchers observed a flickering of light from the accretion disk. This flickering appears to be emanating from material very close to the event horizon, the point of no return

Telescope Science Institute in Baltimore.

While these bursts arise from a mechanism similar to solar flares, which blast hot charged particles into space from our sun, they occur in a different astrophysical environment and at a vastly higher energetic level.

As such, the new observations are not of the black hole itself but of the material surrounding it.

Sgr A* possesses roughly four-million-times the mass of our sun and is located about 26,000 lightyears from the earth.

While the events observed around Sgr A* are dramatic, this black hole is not as active as some at the centres of other galaxies.

The new findings were based on a total of about 48 hours of observations of Sgr A* made by Webb over a year, in seven increments ranging from 6 to 9.5 hours, as the researchers obtained continuous measurements of the brightness around the black hole.

The observations are providing insight into how black holes interact with their surrounding environments. Yusef-Zadeh said that about 90% of the accretion disk's material falls into the black hole while the rest is ejected back into space.

This accretion disk appears to be made up of material accumulated from the stellar winds of nearby stars captured by the gravitational force of Sgr A*, rather than from a star that wandered too close and got shredded, the researchers said.

Topic → violence around Milky Way's central black hole

🌌 James Webb Space Telescope: Launched in 2021, it began collecting data in 2022, providing unprecedented views of the Milky Way's supermassive black hole, Sagittarius A* (Sgr A*).

🔭 Observational Insights: For the first time, astronomers observed the chaotic activity around Sgr A*, including a constant flickering of light from its accretion disk, indicating dynamic interactions.

🌠 Flares and Bursts: The observations revealed one to three large flares daily, along with smaller bursts, suggesting a turbulent environment influenced by extreme gravitational forces.

⚛️ Accretion Disk Dynamics: The accretion disk is characterized by chaotic gas interactions and strong magnetic fields, similar to solar flares but occurring at much higher energy levels.

🌍 Massive Black Hole: Sgr A* has a mass approximately four million times that of the Sun and is located about 26,000 light-years from Earth.

📊 Data Collection: The findings are based on around 48 hours of observations over a year, allowing continuous brightness measurements around the black hole.

🌌 Material Composition: The accretion disk consists mainly of material from stellar winds of nearby stars, rather than from a star that strayed too close.

Summary: NASA's James Webb Space Telescope has provided groundbreaking observations of the chaotic environment surrounding the supermassive black hole Sgr A*, revealing dynamic interactions and flares in its accretion disk.

Manipur's worsening humanitarian crisis

Samrat Sinha

is Professor, Jindal Global Law School (JGLS), Visiting Researcher, Peace Centre Nagaland and Research Adviser (Humanitarian Data) NEST Research Department-Manipur

The India-Myanmar borderlands remain a data-deficient region despite their long history of armed conflict, displacement, and humanitarian crises. The complexity of the Manipur conflict, along with restricted access and adverse security conditions, has led to huge gaps in documenting humanitarian needs. In Manipur, the lack of reliable data obscures the true scale of vulnerabilities and devastation. Misinformation and disinformation further cloud an empirical understanding of the conflict, making it crucial to highlight the serious implications of these information gaps for affected populations. Recent estimates indicate that approximately 58,000 individuals have been forcibly displaced and are living in hundreds of "relief camps" in the Valley and Hill districts. Forced displacement is dynamic, and data collection remains fragmented. In addition, nearly 12,000 people fled to Mizoram at the peak of the conflict, while approximately 7,000 people sought refuge in Nagaland, Assam and Meghalaya.

A zone of 'the unknown'

A critical issue since the onset of the conflict has been the breakdown in the chain of accurate humanitarian information due to the physical separation of the Meitei and Kuki-Zomi communities. Official estimates account only for those in registered relief camps, omitting unregistered individuals living with relatives, in temporary shelters, or displaced across multiple locations. Those who have left the State due to conflict-related circumstances are also unaccounted for. A significant but unrecognised category of affected individuals includes thousands of Manipuri youth who have left in search of better education and livelihood. Another overlooked group comprises those forced to seek medical care outside the State. The conflict has drastically altered health-care-seeking behaviour in Kuki-Zomi-dominated hill districts, with major tertiary health-care institutions in Imphal still inaccessible. Consequently, individuals must take circuitous routes through Mizoram (for those in Churachandpur, Chandel, and Tengnoupal) or Nagaland (for those in Kangpokpi).

The complexity of the conflict has led to huge gaps in documenting humanitarian needs

Medical problems

Meanwhile, displaced populations in the Imphal Valley struggle with increasing out-of-pocket expenses for medical treatment, often leading to a discontinuation of care. Manipur's health-care system, already marked by disparities between the Valley and Hill districts, has deteriorated. The absence of systematic documentation results in underreported cases of mortality, malnutrition, and disease outbreaks. Threats to medical facilities and blockades on essential medicines also remain largely unrecorded. Mortality due to delayed medical access has become an issue, with average journey times for patients from Churachandpur between 17 hours and 24 hours. Some cases documented by a humanitarian data platform highlight the severity of the situation. On May 29, 2023, a 63-year-old displaced person died of cardio-respiratory failure and chronic kidney disease in Kangpokpi district due to a lack of dialysis facilities. In June 2023, a mother died from excessive bleeding after childbirth in a relief camp in Churachandpur district. At the same time, a one-month-old infant was rescued from a relief camp in Bishnupur district after being abandoned by her parents who were unable to care for her. On September 22, 2023, a one-year-old girl died from pneumonia in a relief camp in Churachandpur district.

A recent local media report has documented at least 13 deaths in relief camps in the Valley, including suicides. A study by doctors from the Regional Institute of Medical Sciences (RIMS) in displaced persons camps in Imphal East District found that 65.8% of respondents suffer from post-traumatic stress disorder, while 24.8% experience moderate anxiety and 15.2% have severe anxiety. In Churachandpur district, an ongoing suicide study by a community research institution (NEST Suicide Survey) recorded at least three cases, including a 70-year-old displaced man, who struggled to adapt to camp life after losing his previous livelihood.

It has been more than two years since the first relief camps were formed, yet the basic humanitarian needs of food, water and shelter, remain largely unmet. Dwindling resources, donor fatigue, and conflict-induced inflation have worsened conditions for displaced populations on both sides of the ethnic divide. With over 22,000 children still living in camps, the situation is especially dire, severely impacting education. Unsanitary living conditions, daily water shortages, a lack of access to nutritious food, and the absence of income sources are compounding the crisis.

Focus Manipur

Measures to take

Although violence has decreased in terms of casualties and conflict incidents along inter-district boundaries, forced displacement remains a peripheral issue. The humanitarian crisis in relief camps persists, with a high risk of outcomes worsening as the situation extends into the third year. Mitigating measures are needed. The first is enhancing external cross-cutting humanitarian support by external agencies (including corporate social responsibility entities) to vulnerable populations. The second is augmenting the supplies of clean drinking water, which is a serious issue as a significant portion of household incomes is being used to get water from private sources. The third is creating "humanitarian corridors" that enable the emergency evacuation of serious patients from the hill districts through Imphal airport. The fourth is the restoration of supply chains for the transport of essential commodities, food items and medical supplies from the valley into the hill districts and vice-versa through neutral communities, thereby mitigating inflationary pressures locally.

Topic → The Humanitarian Crisis in the India-Myanmar Borderlands

Introduction

The India-Myanmar borderlands are often overlooked, yet they are a hotbed of humanitarian crises, armed conflict, and displacement. Despite their tumultuous history, this region remains a data-deficient area, making it challenging to grasp the true scale of the issues at hand. In particular, the Manipur conflict has created a complex web of humanitarian needs that are poorly documented, leaving many vulnerable populations in dire straits.

Understanding the Manipur Conflict

Historical Context

To grasp the current situation, we must first look back at the historical context of the Manipur conflict. This region has seen a long-standing struggle between various ethnic groups, primarily the Meitei and Kuki-Zomi communities. The tensions have often erupted into violence, leading to significant displacement and humanitarian crises.

Ethnic Tensions: The rivalry stems from historical grievances and competition for resources.
Impact on Civilians: Civilians bear the brunt of the conflict, facing violence and displacement.

Current Situation

Today, the conflict continues to evolve, with recent estimates indicating that around 58,000 individuals have been forcibly displaced. These individuals are living in hundreds of relief camps scattered across the Valley and Hill districts, but the situation is far from stable.

Relief Camps: Many displaced persons are housed in inadequate conditions.
Ongoing Violence: Clashes between groups continue to exacerbate the crisis.

Data Deficiency in Humanitarian Needs

The Impact of Misinformation

One of the most pressing issues in this crisis is the lack of reliable data. Misinformation and disinformation cloud our understanding of the conflict, making it crucial to highlight the serious implications of these information gaps for affected populations. Without accurate data, humanitarian efforts are hampered, and the true scale of vulnerabilities remains obscured.

Misinformation: Spreads quickly, distorting public perception and response.
Data Gaps: Lack of systematic data collection leads to underestimating needs.

The Scale of Displacement

The forced displacement in Manipur is dynamic, with data collection remaining fragmented. Many individuals are unaccounted for, living in temporary shelters or with relatives. The conditions in relief camps are often dire, with basic needs like food, water, and shelter remaining unmet.

Unregistered Individuals: Many remain invisible to aid organizations.
Living Conditions: Relief camps lack adequate sanitation and resources.

Medical Challenges Faced by Displaced Populations

Health Care Access Issues

The conflict has drastically altered health-care-seeking behavior, particularly in Kuki-Zomi-dominated hill districts. Major health-care institutions in Imphal remain inaccessible, forcing individuals to take circuitous routes through neighboring states for medical assistance.

Barriers to Access: Roadblocks and violence hinder medical transport.
Mortality Cases: A 63-year-old displaced person died due to lack of dialysis facilities.

The Psychological Toll

The psychological impact of the conflict cannot be overlooked. A study found that 65.8% of respondents in displaced persons camps suffer from post-traumatic stress disorder, while many others experience varying degrees of anxiety. The mental health crisis is exacerbated by the harsh living conditions in relief camps.

Mental Health Crisis: Significant numbers face PTSD and depression.
Need for Support: Psychological assistance is critically lacking.

Basic Humanitarian Needs

Food, Water, and Shelter

Despite the passage of time since the first relief camps were established, basic humanitarian needs remain largely unmet. Dwindling resources and donor fatigue have worsened conditions for displaced populations, with over 22,000 children still living in camps, severely impacting their education and overall well-being.

Unmet Needs: Access to clean water and nutritious food is scarce.
Child Impact: Educational opportunities for children are severely limited.

Measures to Address the Crisis

To mitigate the ongoing crisis, enhancing external humanitarian support is crucial. This includes collaboration with corporate social responsibility entities to provide aid to vulnerable populations.

Collaboration: Partnering with local NGOs can amplify efforts.
Humanitarian Corridors: Establishing routes for emergency medical care is vital.

On building resilient telecom infrastructure

What does the Coalition for Disaster Resilient Infrastructure report state? Why do telecom networks face elevated risks in coastal regions in times of disaster and calamity? Why are undersea cables preferred over overland cables? Is power failure a significant challenge?

EXPLAINER

Aroon Deep

The story so far:

The Coalition for Disaster Resilient Infrastructure (CDRI), a multilateral organisation launched by Prime Minister Narendra Modi in 2019, put out a report earlier this month studying Indian telecom networks' preparedness in the event of disasters. The report suggests ways in which State governments can better prepare for calamities that may impact telecom networks.

Why is it important?

Telecom networks are crucial to handling disasters, because they allow the State and National Disaster Management Authorities to communicate quickly with local municipalities and the State and Union governments; something that is important when lives and property are at stake. Telecom networks are particularly vulnerable, as they comprise cabling that may not be fully underground, towers that may not be able to withstand high wind speeds, and because they rely on a steady flow of electricity, which is frequently disrupted by disasters like cyclones and earthquakes.

How are they impacted in disasters?

On top of towers being hit by high-speed winds, overland cables – as opposed to underground ones, which can be protected from many disasters – can snap. Coastal regions face elevated risks, as that is where undersea cables connect India with the global internet. If the landing stations of these cables are impacted, there can be massive network disruptions as telecom operators try to reroute traffic through other cables.

The lack of power during disasters remains a major issue. "When I first joined here, I did my own analysis of data of telecom outages since 2016, and found that the real issue was power," Sanjay Agrawal, deputy director general of disaster management at the Department of Telecommunications said.

Major hazard: Officials remove Optical Fibre Cables which were hanging in Bengaluru, 2018. FILE PHOTO

What can be done?

Severed undersea cables have a time-consuming repair process that involves a repair vessel arriving near the coast and rejoining the cables. However, since much of the disruption is attributable to power failures, much can be accomplished during a disaster by maintaining or restoring power supply to telecom towers and the network operating centres to which they're connected. Telecom operators have typically never deployed towers assuming 24/7 power supply – with the possible exception of Mumbai – and have battery as well as fuel backup.

Pradeep Kumar Jena, former Chief Secretary of Odisha, said, "sometimes a tower operator may not have enough power available at a time of disaster for whatever reason – one can't [pass around] blame at that point of time," and when this happens, "we decide, let's give every telecom operator 50 litres of fuel." Even if the fuel is wasted, the ₹50 lakh spent on it goes a long way in keeping networks online, he said. This is complemented with information from the DoT. "We get data from all telecom operators on damages to their assets for every disaster," Mr. Agrawal said. "We have software to monitor in real time what telecom assets are down." As such, resources can be deployed quickly to bring sites back online.

How can networks be protected?

The CDRI report recommends a few measures to develop a resilient telecom network These include greater data collection and more coordination among officials, a more robust power infrastructure (resilient power infrastructure is also an area where CDRI focuses an enormous amount of effort on), and requiring cell towers to withstand higher wind speeds, especially in coastal States and districts where hurricanes make landfall. The CDRI also advocates for a dig-once policy, which recommends building as much underground civil infrastructure, like water and gas supply lines, drainage and fibre optic cables simultaneously, reducing the risk of cables being damaged when other infrastructure is built. Existing damage to underground cables can greatly exacerbate disruptions when other parts of a network go down.

"The short- to medium-term roadmap suggests the need to update disaster damage and loss data format, mainstream disaster risk modelling into telecommunications infrastructure planning across all miles, strengthen telecommunications asset design based on local and regional hazard vulnerability profiles," and other steps to plan ahead, the report says. There are also commercial interventions that the report touches on. A key one is parametric insurance, a system where telecom operators are not left to bear the commercial burden of a disaster all by themselves, and are thus financially incentivised to bring networks back online rapidly (and presumably to nudge them to disaster-proof their infrastructure well enough to keep premiums down).

Telecom resilience comes down to a mix of both massive interventions as well as small investments that can have an outsize benefit. For instance, during heavy rains, diesel generators can stop working even at knee-level flooding. One simple intervention that can go a long way in keeping towers online is by simply installing the generator a little higher up the tower, so that the backup power can kick in even during flooding.

THE GIST

- Telecom networks are crucial to handling disasters, because they allow the State and National Disaster Management Authorities to communicate quickly with local municipalities and the State and Union governments.
- The CDRI report recommends a few measures to develop a resilient telecom network These include greater data collection and more coordination among officials, a more robust power infrastructure, and requiring cell towers to withstand higher wind speeds, especially in coastal States and districts where hurricanes make landfall.
- Coastal regions face elevated risks, as that is where undersea cables connect India with the global internet.

Topic → Disaster Resilient Infrastructure (CDRI) Report

Telecom networks are the unsung heroes in the throes of calamity. They serve as the lifeline, enabling swift communication between disaster management authorities and local entities. Recently, the Coalition for Disaster Resilient Infrastructure (CDRI) released a pivotal report, unveiling the vulnerabilities of Indian telecom systems in disasters and recommending measures for fortification. 📡

Why is this essential?

Rapid Communication: Vital for coordinating rescue and relief efforts.
Infrastructure Vulnerability: Existing telecom systems often lack the robustness required to withstand natural disasters.

The Vulnerability of Telecom Networks

Telecom networks are increasingly susceptible to disruptions during disasters. Here are the primary challenges:

Physical Infrastructure: Towers and cables can be severely impacted by extreme weather. 🌀
Power Dependency: A constant power supply is crucial, yet frequently disrupted during calamities.

Impact of Infrastructure

Overland vs. Underground Cables: Overland cables are prone to snapping during storms.
Coastal Risks: Undersea cables connecting India to global networks face significant threats from severe weather

Strategies for Improved Preparedness

The CDRI report outlines vital strategies to enhance telecom resilience:

Robust Power Infrastructure: Ensure backup systems can sustain operations during outages. 🔋
Enhanced Coordination: Improved data sharing between telecom operators and disaster management agencies.

Recommendations

Dig-once Policy: Advocating for simultaneous underground infrastructure development to safeguard against damage.
Regular Assessments: Continuous evaluation of telecom assets in disaster-prone areas.

Innovative Solutions for Telecom Resilience

Leveraging technology can significantly bolster telecom networks:

Data Monitoring Systems: Real-time tracking of network status can expedite repairs. 📊
Elevated Equipment Installations: Prevent flooding issues by placing generators higher on towers.

Successful Implementations

Case Study: Mumbai's telecom infrastructure, noted for its resilience, showcases the benefits of proactive measures.

Commercial Interventions and Financial Support

Parametric insurance can play a pivotal role in ensuring telecom operators are adequately supported during disasters:

Financial Incentives: Encouraging quick restoration of services.
Shared Burden: Reducing the financial risks associated with disaster recovery.

Funding Strategies

Government Support: Financial backing for infrastructure upgrades.
Public-Private Partnerships: Collaboration to foster resilient systems.

Conclusion

In an era where disasters are increasingly frequent, enhancing the resilience of telecom networks is paramount. The CDRI's recommendations serve as a blueprint for stakeholders to fortify communication infrastructure, ultimately saving lives and properties during crises.

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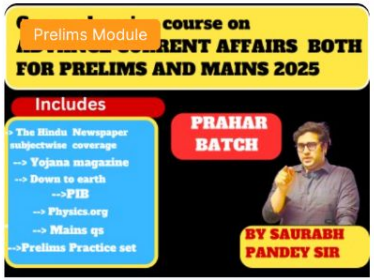

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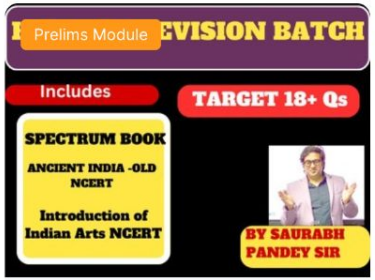

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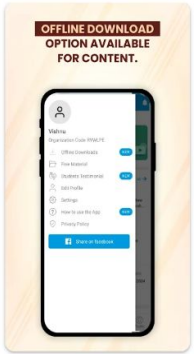

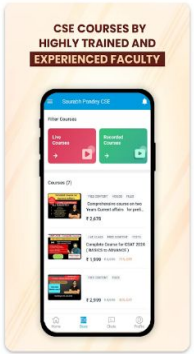

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