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India's Next Generation of Telescopes May Face a Disappearing Night Sky

By: Rashmi

India has sanctioned its most ambitious investment in astronomy, centred on Hanle in Ladakh, its only dark sky reserve. But light pollution there is increasing, and India has no national law to address it. Chile's battle to protect its telescope sites shows what is at stake.

When India's finance minister rose to present the union budget in February 2026, buried among the headline numbers was a quiet landmark for Indian science: funding for three new telescopes and an upgrade for a fourth. Among them is a 10-12-metre optical telescope, which would place India among a very small number of countries operating facilities at the frontier of ground-based astronomy.

Two of these four telescope projects are destined for Hanle, a remote Ladakhi village that sits at an altitude of 4,500 metres, and is home to the Indian Astronomical Observatory (IAO). It is the nation's only designated dark sky reserve. The skies here are exceptionally dark and clear, largely unaffected by the monsoon. The core of our Milky Way galaxy is easily visible to the naked eye, and so is the Zodiacal light, a faint pyramid of light stretching across the sky, produced by sunlight scattering off dust in the inner solar system, and invisible from almost anywhere else in India.

These same skies are also getting brighter, year by year.

Threat to the Site

The IAO was established at Hanle in 2000, following surveys that identified the site's exceptional conditions: high altitude, low atmospheric water vapour, a rain-shadow location largely unaffected by the monsoon, and a long history of clear nights. Over the next 25 years, the observatory has developed into India's most capable high-altitude astronomical facility, anchored by the Himalayan Chandra Telescope, a 2-metre optical telescope that is controlled remotely from Bangalore via a dedicated satellite link.

The observatory's remote location has not kept the world away. Ladakh's popularity as a tourist destination has been rising steadily over the past few decades. The road to Umling La, the world's highest motorable pass for which Hanle is the nearest village, has brought a sustained increase in adventure tourists to the region. With tourists came light, from the windows of ever-increasing homestays to vehicle headlights. "Our telescopes were getting severely affected because of the light beams," said Dorje Angchuk, engineer-in-charge of the IAO.

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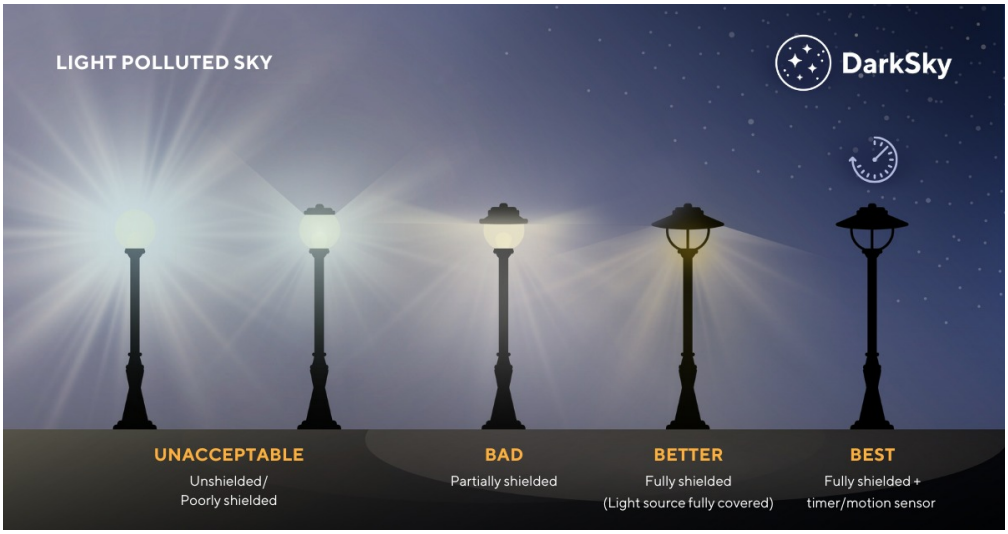
The vulnerability became apparent as early as 2019, when a 2,500 MW government-backed solar project was proposed for the Hanle area. "We found out suddenly it was coming," said Angchuk. The observatory requested the plant be located at least 25 to 40 kilometres away, and it was eventually shifted. It was the Changthang Wildlife Sanctuary designation, which encompasses Hanle, rather than a light pollution law, that provided the protection.

The astronomers' response was to seek a formal designation. "We just sat together and thought: many observatories around the world are protected by dark sky designations. It would be quite a good time to do that in Hanle also," said Angchuk. A dark sky reserve is a protected zone with a scientifically managed dark core, surrounded by a community buffer area where lighting is governed by agreed guidelines.

What followed was a deliberate process of community consultation. "We told them: you can use light, but use it judiciously," said Angchuk. "And we told them this would be a long-term solution, something that gives Hanle its own identity rather than just being another stop on a road trip."

The Ladakh administration backed the proposal, and in December 2022, Hanle was officially declared India's first dark sky reserve. Twenty-four local astronomy ambassadors were trained and provided with telescopes, building a community that could both protect the

skies and welcome visitors who came to see them. The Indian Institute of Astrophysics distributed warm-coloured bulbs and lampshades to homestays, and a Light Management Plan was drawn up prescribing rules for keeping light pollution within the reserve to a minimum.



Hanle is not alone. The Pench Tiger Reserve in Maharashtra has since become India's first International Dark-Sky Association-certified dark sky park, and Tamil Nadu recently announced a dark sky park in the Kolli Hills. These are encouraging signs of a growing movement towards dark sky advocacy. But all of these designations share a common limitation: none rest on a national legal foundation.

Each exists because a local person, authority or institution chose to act. And at Hanle, even that choice has not been enough. The dark sky reserve carries no enforcement power under national law.

There is no requirement for hotels, roads, or infrastructure projects nearby to assess their light impact. The guidelines that homestays and villagers follow exist because they chose to, not because the law requires it. The challenge extends beyond tourism. The region also hosts a significant defence presence, and Angchuk has been working to sensitise military personnel about the observatory's needs. "It is an ongoing process," he said.

> A dedicated community built a reserve, trained ambassadors, changed their lightbulbs, and drew their curtains. The skies got brighter anyway, because the people who did not participate-the new hotels, the tourists arriving after dark, the passing convoy-had no obligation to.

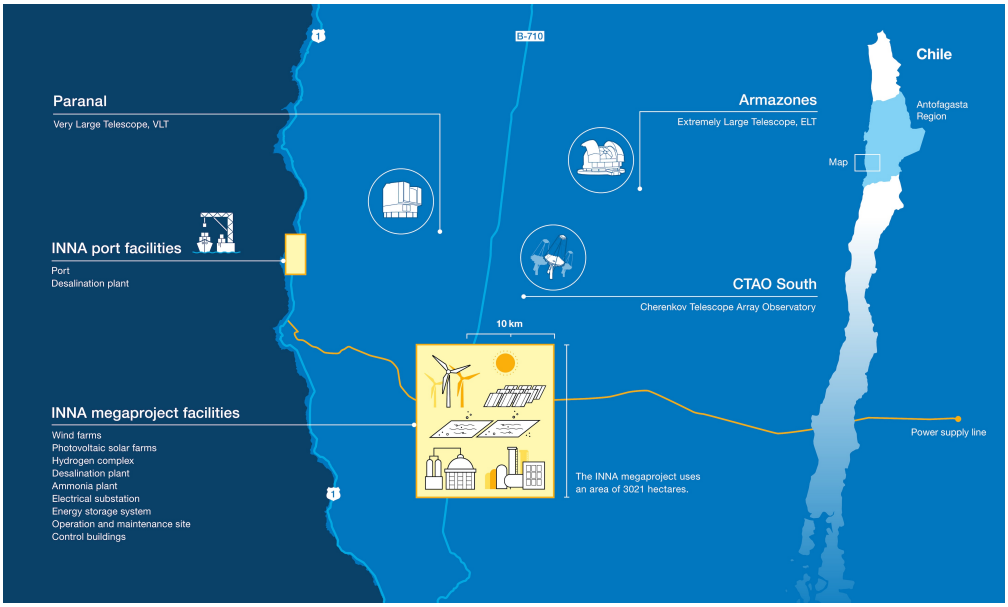
The evidence is in the numbers. Since 2023, the IAO has been continuously measuring its night sky brightness and makes this data available on its website. For years, Hanle held a Bortle-1 rating, the darkest classification on a nine-point scale that measures light pollution, where lower numbers mean darker skies. But recent data suggests the site's sky quality is at the risk of slipping to Bortle-2. "It has increased," said Angchuk of the light pollution. "Obviously, you cannot stop development."

A dedicated community built a reserve, trained ambassadors, changed their lightbulbs, and drew their curtains. The skies got brighter anyway, because the people who did not participate-the new hotels, the tourists arriving after dark, the passing convoy-had no obligation to. The stakes become clearer when you look at what happened halfway across the world.

Fight for Paranal

Chile has among the strongest light pollution laws in the world. In early 2026, the country concluded a year-long public battle to prevent a $10-billion green hydrogen megaproject from being built a few kilometres from the European Southern Observatory's Paranal site, one of the finest astronomical facilities on Earth. The campaign drew support from Nobel laureates, scientists, indigenous communities, and national environmental law.

In December 2024, AES Andes, a subsidiary of the US-based AES Corporation, filed plans for INNA, or Integrated Energy Infrastructure for the Generation of Green Hydrogen and Ammonia, in Chile's Atacama Desert. The proposal covered more than 3,000 hectares of solar panels, wind farms, and processing facilities, designed to convert sunlight and wind into exportable fuel. Its location, however, placed the megaproject just 11 km away from ESO's telescopes.



The ESO's analysis found that INNA would increase artificial sky brightness above the Very Large Telescope by at least 35%. The analysis also warned that air turbulence, ground vibrations, and construction dust could further degrade observing conditions.

The megaproject had proceeded through the approval pipeline because it technically complied with existing standards. Its consultants argued it would cause only a 0.27% increase in absolute sky brightness. "If you are in a city, one more lamp doesn't matter," said Andreas Kaufer, ESO's director of operations in Chile. "If you are in one of the darkest places on Earth, a small absolute increase becomes a huge relative impact." Since Paranal's baseline artificial light contamination is roughly 1%, adding 0.3% translates to roughly a 30% relative increase.

Daniela González, executive director of the Skies of Chile Foundation, traces the problem to its source: the lighting standards that AES Andes relied upon were derived from a 1979 recommendation by the International Astronomical Union, drawn up long before the era of massive optical telescopes in the Atacama. "Fifty years later, you have telescopes that didn't even exist on paper back then," she said. "That number is completely outdated."

The ESO raised the alarm publicly in early 2025, drawing in the broader astronomical community. Nobel laureate Reinhard Genzel led an open letter signed by 30 eminent astronomers and raised the matter in person during a visit to Chile with Germany's president. More than 700 formal submissions were filed through Chile's citizen participation process, a formal public consultation mechanism under the country's environmental review framework through which residents can comment on proposed projects and compel regulators to respond.

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González noted that submissions came not just from astronomers but also from indigenous fishing communities and local residents who were concerned about the project's broader environmental and territorial impact.

In late January 2026, AES Andes quietly withdrew its application. The company's statement made no mention of astronomy or light pollution, and the global green hydrogen market had been softening significantly since 2022. How much the campaign influenced that decision is difficult to establish. What is not in dispute though is that Chile had the legal tools to mount a challenge, and citizens and scientists used them together. The public pressure mattered because the law gave people a formal way to intervene; citizen action and regulation reinforced each other.

"Light pollution is not only an astronomical issue. It is an environmental one," González said. "It affects ecosystems and people's health, so it stops being a niche problem for astronomers and becomes something that concerns anyone who lives under a sky that is too bright at night."

India has not yet made that recognition.

Unaddressed Gap

India's Environment Protection Act of 1986 covers air, water, and soil. Artificial light at night is not mentioned. "Light pollution should be treated like any other environmental externality, just like air or noise," said Shweta Kulkarni, founder of AstronEra and a dark sky policy strategist. "Projects near observatories must assess how artificial lighting will spread and affect both ecosystems and the night sky. Including it in environmental impact assessment ensures that mitigation is built into projects from the start, rather than corrected later." The problem, Kulkarni argued, runs deeper than regulation.

"Light pollution is still not widely recognised as pollution. There's also a misconception that it is only an urban issue, whereas poorly planned lighting in rural areas can quickly erase some of India's last remaining dark skies." Kulkarni added, "Dark sky reserves need a legally backed Lighting Management Plan, clear inter-departmental ownership, and continuous monitoring. Without these systems, a dark sky tag risks becoming symbolic rather than protective."

Maharashtra, where Kulkarni has been working on a state-level policy, offers a glimpse of what systematic action might look like. In August 2025, Chief Minister Devendra Fadnavis pledged to make it the first state to draft a Dark Sky Conservation Policy. Whether it becomes a national model remains to be seen.

For such a model to take root nationally, awareness of light pollution must extend beyond the astronomy community. The science on the effects of artificial light at night on sleep, circadian regulation, and broader human well-being is substantial and growing. "Community awareness ensures that residents, businesses, and local institutions become active participants in protecting the night sky. When people experience a truly dark sky, they are far more likely to support and sustain these efforts," Kulkarni said.

The INNA case, Kulkarni notes, is instructive precisely because it happened where strong laws already existed. "It is a reminder that protecting the night sky requires foresight, not just correction after damage is done." In Hanle, residents and officials have shown they will protect dark skies when they understand what is at stake. But relying on voluntary choices alone has limits. Hanle shows how far local action can go; the INNA case shows the point at which only law can draw a line.

Hanle has everything India's next generation of telescopes need: dark sky initiatives, communities, scientists, and world-class sites. But it lacks the law to make it lasting. Whether it still will depends on decisions yet to be made.

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