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What is the extent of the global share of solar energy?

What does the World Solar Report 2024 by the International Solar Alliance state?

Ajay Mathur
Saba Kalam

The story so far:

On November 5, the World Solar Report 2024 by the International Solar Alliance (ISA) was released. From 1.22 GW in 2000, the world's solar capacity has surged to 1,419 GW in 2023, charting a CAGR of about 36%. Today, solar capacity represents three-quarters of all renewable capacity additions worldwide.

What are new solar technologies?

Quantum dot solar cells have achieved a record-breaking efficiency of 18.1%, offering a promising approach to enhance solar energy capture and power atmospheric water harvesting technologies. Researchers are creating self-healing solar panels to extend the lifespan and reduce the maintenance of existing solar cell technologies.

Solar-powered phyto-mining uses solar energy to power the extraction of valuable metals from soil-using plants, offering a sustainable alternative to traditional mining practices. Solar paver blocks integrated with building infrastructure and BIPV (Building Integrated PV), like transparent solar panels, allow light transmission and visibility. The development of these alternative technologies will reduce reliance on critical materials like lithium and rare earth elements. The solar sector is also prioritising recycling panels and implementing circular economy practices to minimise environmental impact.

Have reducing costs helped?

The 2024 World Solar Report shows that the average auction prices for utility-scale solar photovoltaic (PV) projects have consistently decreased across all regions. Utility-scale solar PV costs averaged $40/MWh in 2024. India topped the global charts in solar PV capacity granted through auctions, securing a notable auction price of $34/MWh. Investment in solar PV technology within the power sector is expected to surpass the $500 billion mark by 2024, outstripping the combined investment in all other generation forms.

What about the global market?

As of 2023, China dominates solar PV as 43% (609 GW) of the cumulative capacity of solar panels installed globally is from China. The U.S. contributes 10% (137.73 GW). Japan, Germany, and India each captured a 5-6% share. Emerging solar markets like Brazil, Australia, Italy, and Spain each contributed about 2%. Solar PV manufacturing has nearly doubled in capacity for wafers, cells, and modules in 2023. China maintained the highest share in component manufacturing in 2023, with 97% in wafers, 89% in cells, and 83% in module installation capacity.

Has solar impacted other industries?

Employment in the solar PV sector rose to 7.1 million jobs in 2023, up from 4.9 million in 2022 worldwide, indicating a significant increase from the previous year and underscoring the sector's role in job creation and economic development. Solar-powered irrigation systems are transforming agriculture. The global solar pump market is expected to grow at a CAGR of 5.8% from 2021 to 2027, driven by declining costs of solar PV technology, cost competitiveness of solar-powered pumps, especially when compared to diesel-powered water pumping, and increased awareness among farmers. Beyond crop farming, agrivoltaics systems are being used in livestock management, with solar panels installed in pastures to provide shade for animals while simultaneously generating electricity. One of the key factors driving the adoption of solar systems has been the introduction of pay-as-you-go business models, allowing users to pay for their systems in small, regular instalments.

Technological advancements have made solar energy more affordable, while new applications are further driving adoption. We must promote technology and finance transfer, especially to the least developed and small island developing countries, to ensure no one is left behind.

Ajay Mathur is DG of the ISA, and Saba Kalam is Programme Specialist at the ISA.

THE GIST

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The code of conduct judges need to follow

Judiciary draws its power from two fountains, public acceptance of the authority of the judiciary and the integrity of the judiciary. The Bangalore Principles of Judicial Conduct 2002 presents a framework to regulate judicial conduct

LETTER & SPIRIT

Krishnadas Rajagopal

The comments made by Allahabad High Court judge, Justice Shekhar Kumar Yadav, against the Muslim community at an event organised by the legal cell of the Vishwa Hindu Parishad in the High Court premises on December 8, has drawn public flak.

Justice Yadav has said that the country would function as per the wishes of the majority living in Hindustan. He remarked that while children of one community are taught kindness and tolerance, it would be difficult to expect the same from children of "another community" especially when they witness animal slaughter. On the push for the Uniform Civil Code, Justice Yadav has said that Hindus revere women as goddesses even as members of the "other community" practice polygamy, Halala or triple talaq. The Supreme Court, in a statement, said it has taken note of the newspaper reports on Justice Yadav's speech. It said details have been asked from the Allahabad High Court and that the "matter is under consideration".

In light of Justice Yadav's remarks, the All India Lawyers Union have written to the Chief Justice of India (CJI) Sanjiv Khanna, saying the judge's comments lean away from democracy and towards a "Hindutva Rashtra". The Campaign for Judicial Accountability and Reforms led by advocate Prashant Bhushan, in its letter to the CJI, has alleged that Justice Yadav's participation in a "right-wing event" and his communally-charged statements were a brazen violation of his oath of office. Supreme Court Bar Association president, senior advocate Kapil Sibal, has reportedly called for the impeachment of the High Court judge.

ISTOCKPHOTO

On judicial ethics

Judiciary draws its power from two fountains, public acceptance of the authority of the judiciary and the integrity of the judiciary. Experience gained over time has led the judiciary to codify the best conventions of judicial conduct, both in and out of court. The 'Restatement of Values of Judicial Life' is the primary code of ethics governing judicial behaviour adopted by the Supreme Court on May 7, 1997.

The very first rule of the code is that the behaviour of a judge must "reaffirm the people's faith in the impartiality of the judiciary". It underscored that "any act of a judge of the Supreme Court or a High Court, whether in official or personal capacity, which erodes the credibility of this perception has to be avoided". Justice Yadav seemed to have missed the last rule of the code which mandated that "a judge must at all times be conscious that he is under the public gaze". The Bangalore Principles of Judicial Conduct 2002 presents a framework to regulate judicial conduct. It requires a judge to ensure that his or her conduct, both in and out of court, maintains and enhances the confidence of the public, the legal profession and litigants in the impartiality of the judge and of the judiciary. While the 2002 document recognises a judge's entitlement to freedom of expression, it mandates that he or she "shall always conduct himself or herself in such a manner as to preserve the dignity of the judicial office and the impartiality and independence of the judiciary". More importantly, the charter requires a judge to be "aware of and understand" the diversity in society and treat all equally.

How is a judge impeached?

The Constitution mandates that judges of the Supreme Court and High Courts can be removed by an order of the President after a successful process of impeachment on the grounds of "proved misbehaviour or incapacity". The motion of removal of a constitutional court judge must be supported by a special majority of the total membership of the House and of at least two-thirds of the members of the House present and voting. Except on a removal motion, the Constitution prohibits the legislature from discussing allegations of misconduct of judges in any other context. However, the Supreme Court has also evolved an in-house procedure to give judges facing serious allegations a window to take voluntary retirement, sparing themselves and the judicial institution the public embarrassment of an impeachment.

The procedure was formally adopted in 1999, and was put out in the public domain by the Supreme Court in 2014. The procedure allows a complaint against a High Court judge to be addressed to the President, the CJI or the Chief Justice of the High Court concerned. If a complaint is received by the High Court Chief Justice, depending on the seriousness of the grievance, a response can be sought from the judge concerned. On receiving the response, and if a deeper probe is called for, the Chief Justice could forward the complaint and the statement of the judge to the CJI.

The President, on receiving a complaint, refers it to the CJI. The CJI, either on receiving a complaint directly or referred to by the President, can forward it to the Chief Justice of the High Court concerned, who would follow the same procedure of collecting a statement from the judge concerned and returning it to the CJI if the allegations were serious enough to require an investigation. The CJI can then appoint a fact-finding committee of two Chief Justices from other High Courts and a High Court judge to inquire into the allegations.

If the committee reports sufficient material to remove the judge, the CJI can ask the latter to retire. In case, the judge refuses to do so, the CJI can intimate the President and PM about the allegations along with the committee report, clearing the way for impeachment.

THE GIST

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Ends without means

While goals of UGC reforms are clear, they need to be backed by resources

The Draft UGC (Minimum Standards of Instruction for the Grant of Undergraduate Degree and Postgraduate Degree) Regulations, 2024 propose significant changes to India's higher education landscape. These include bi-annual admissions to undergraduate (UG) and postgraduate (PG) courses, enabling students from any stream to pursue any discipline in UG and PG if they pass a relevant national qualifying examination, and allowing for the extension or acceleration of courses. Students can pursue multiple degrees simultaneously. Higher educational institutions will have the autonomy to determine student attendance requirements. According to the UGC Chairman, M. Jagadesh Kumar, these changes will remove rigidity, ensuring that global standards are met. While the intent is laudable, one provision further centralises examinations as a qualifying criterion, which may limit flexibility. The draft rules align with the National Education Policy (NEP) 2020, which emphasises hybrid learning models and skill-based education. The draft rules also support the implementation of the National Credit Framework, providing students greater academic flexibility.

However, while the goals of these reforms are clear, the question is whether there are resources to implement such sweeping changes. Hurdles exist as systemic issues such as insufficient faculty strength, underfunded institutions, and a lack of adequately trained or motivated teachers. Moreover, the regulatory framework, such as on class strength requirements, governing affiliated colleges where a majority of the students study, is ill-equipped to support these new rules that may be implemented more easily in autonomous institutions. Since education is on the concurrent list, State governments often show initial compliance with new regulations only to backtrack. The inertia within academic bodies and administrative procedures further complicates the effective adoption of changes such as the 'academic bank of credits'. This initiative allows students to register at one institution, take courses from another, and complete apprenticeships in a company, with the degree being awarded by the first institution. While such flexibility is groundbreaking, it faces considerable resistance from traditional academic structures. Moreover, the success of these reforms hinges on a substantial increase in investment in education. Unfortunately, this year's Budget allocates 15% less funding to higher education compared to the previous year's revised estimates. While the draft UGC rules offer a promising vision, their success will depend on addressing existing systemic challenges and ensuring that there are adequate resources in place.

Two to tango

India and Bangladesh must grapple with the new realities in ties

Amidst fast-deteriorating ties between India and Bangladesh, Indian Foreign Secretary Vikram Misri's one-day visit to Dhaka provided a much-needed outreach to the interim government led by Professor Muhammad Yunus. The bilateral, and once model, relationship, with Bangladesh, has been unravelling ever since Prime Minister Sheikh Hasina fled to India. These include India's concerns over attacks on minorities, particularly Hindus, Bangladesh's anger over 'unwanted Indian interference', and Ms. Hasina's continued stay in India as Bangladesh calls for her to stand trial over charges of police crackdowns and corruption. In particular, protests in India against Bangladesh's arrest of a Hindu monk for sedition, which led to an attack on their mission in Tripura, and marches against Indian missions and cultural centre in Dhaka, had fuelled anger in both capitals. After talks with Mr. Yunus, Bangladesh Foreign Affairs Adviser Touhid Hossain and Bangladesh Foreign Secretary Muhammad Jashim Uddin, Mr. Misri stressed New Delhi's "desire to work closely with the Interim Government of Bangladesh", which was well-received. Unlike the shrill rhetoric in Delhi, his measured comments acknowledged the concerns of both sides over the "regrettable incidents of attacks on cultural, religious, and diplomatic properties". Mr. Yunus is understood to have described the relationship between Bangladesh and India as "very solid" and "close", asking India to help "clear the clouds". He also said that Ms. Hasina's statements were creating "tensions" in Bangladesh, an issue that India must consider carefully. The two sides also picked up the threads of previous talks on border management, trade, and connectivity, cooperation in water, energy sectors, development cooperation, consular, cultural and people-to-people ties.

Given the largely positive optics of the visit, it would appear that there is an attempt to chart a new course in ties. While it is important for New Delhi to nudge its friends on issues of concern such as the attacks on minorities, as well as the need to restore a democratic and inclusive process at the earliest, the Modi government must also be prepared to hear the worries of its friends and neighbours on such issues that have a spillover effect in the region. At a time when changes in governments in Nepal, Sri Lanka and the Maldives have thrown up challenges to India, the violent change in Bangladesh, that saw the ouster of an India-friendly leader, was no doubt a blow. It is time, however, for India to engage with the new realities in Bangladesh, based on a strong understanding that a close, consultative partnership is in the enduring interests of both countries.

Deepening India's steps as a key space-faring nation

India has set ambitious goals for its space programme in the next two decades. These goals hinge on powerful, reusable rockets such as the Indian Space Research Organisation (ISRO)'s upcoming Next Generation Launch Vehicle (NGLV). In addition to the NGLV, India must tap into its private sector to develop more such rockets in order to secure strategic autonomy in its access to outer space.

Ashwin Prasad

a Research Analyst at The Takshashila Institution

ISRO's road map

From an infant space programme in the 1960s, India has grown into a powerful space-faring nation. Preparations for the Gaganyaan mission are underway. Gaganyaan will take an Indian crew to space for the first time, demonstrating Indian human-spaceflight capability. By the end of the next decade, India aims to have a more sustained presence in space by having its own space station in orbit around earth. It also aims to expand its human-spaceflight capabilities to the moon.

Realising these objectives effects a road map that consists of multiple uncrewed missions to the moon, mastering human-centric technologies for space travel and developing powerful new rockets. These rockets have to carry heavier payloads to support humans in space. They should also be financially viable as it will take many test flights to reach the safety and the reliability standards for human-spaceflight to the moon. ISRO is fulfilling these requirements with its upcoming NGLV, which has been recently approved for development by the Union Cabinet.

The significance of the NGLV lies in its heavy lift capability and reusability. The NGLV will triple the payload capacity of the LVM3 (Geosynchronous Satellite Launch Vehicle Mk III), which is India's most powerful rocket. This comes with numerous benefits. Heavy lift rockets ease restrictions related to weight and volume. It frees up the focus of engineers and scientists that would otherwise have to be spent on miniaturisation or weight reduction. It greatly increases the potential of space-related missions. The possibilities increase exponentially.

Space is an emergent sector with much potential for commercialisation

In contrast to all of India's existing rockets which are expendable as they are built for one-time use, a major part of the NGLV will be reusable. Reusability requires that the rocket keep some of its fuel for controlled descent back to the earth's surface. This reduces the capacity of the rocket to carry heavier loads but offers massive cost savings. Reusability has become necessary for rockets to remain competitive.

The immediate need

The NGLV's development phase will last for the next eight years. In the meantime, the need for heavy lift capability is already felt. India's next uncrewed moon mission is slated to use not one, but two rockets. Two LVM3s will carry the requisite modules. They will then be assembled in space to form one composite vehicle that will go to the moon.

In another instance, GSAT-N2, a communication satellite built by ISRO, was launched on SpaceX's Falcon 9 rocket. It weighed 4,700 kg while the maximum weight that an LVM3 can carry to the Geostationary Transfer Orbit (GTO) is 4,000 kg. A reusable Falcon 9 from SpaceX, a U.S. company, can carry up to 5,500 kg to the Geostationary Transfer Orbit (GTO). Foregoing reusability, an expendable Falcon 9's capacity increases to 8,300 kg. Even this figure is dwarfed in comparison to SpaceX's Falcon Heavy and Starship rockets.

The Starship, which completed its sixth test flight recently, has already achieved significant milestones surrounding heavy lift and reusability. Its mind-boggling capacity to lift over 21,000 kg to the GTO (1,00,000 kg to the Low Earth Orbit) while remaining reusable, shows that the Starship is already past the level of advancement that the NGLV hopes to achieve at the end of its eight-year development phase.

Leveraging the private industrial base

This is no surprise given ISRO's wider scope, capability and focus. However, it also raises questions about why India is not exploring more paths to produce multiple reusable, heavy lift rockets.

In parallel to developing the NGLV, the Department of Space can give out contracts to the private industry in India to design and develop reusable, heavy lift rockets of their own. Space is an emergent sector with massive potential for commercialisation.

There is likely to be strong private sector interest in India to take up these contracts with the right incentives. Even with a lack of existing faculty in rocket technology among Indian corporations, they can explore foreign collaboration. For instance, various rocket engines are already sold commercially.

A milestone-based funding mechanism where the Department of Space pays private players after they meet certain objectives at every stage is a great way to ensure accountability and reduce cost overruns. In the best case, India may end up with multiple NGLV-like rockets alongside the NGLV, resulting in much-needed redundancy and greater launch frequency. In the worst case, there may be delays but that is accompanied by positive spillovers of innovation, technical capability and infrastructure which will ultimately yield positive outcomes.

The entire gamut of space activities, which ranges from using satellite data for development to extending Indian presence to the moon and Mars, hinges on a resilient supply of space transportation services. India must foster a strong ecosystem for the growth of a specialised industrial base that can cater to India's needs and ambitions in outer space.

QUESTION CORNER

Two hominin species 'existed' together

Q: Have different hominin species coexisted?
A: Yes, researchers recently reported a remarkable example of this possibility. More than a million years ago, in a place in modern-day Kenya, two distinct hominin species walked together.

Researchers revealed this extraordinary piece of history when they found fossilised footprints near the lake dating to the Pleistocene Epoch.

These 1.5-million-year-old tracks, described in a study published in *Science*, provide the first concrete proof of two hominin species coexisting.

Discovered in 2021, the footprints are of Homo erectus, a direct ancestor of modern humans, and *Paranthropus boisei*. Researchers have been able to shed light on the behaviours and interactions of these species as they navigated the tough African terrain. The tracks were found on soft sediments near the lake's shore. Footprints can capture the movement of ancient life in their natural environments.

According to Kevin Hatala, the study's lead author and a professor at Chatham University, Pennsylvania, footprints often reveal details bones can't.

The coexistence of *H. erectus* and *P. boisei* underscores the complexity of human evolution. Both species walked upright and on two feet but occupied different ecological niches. *H. erectus* hunted for meat, while *P. boisei* was adapted to a diet rich in tough vegetation.

The fossil record also suggests divergent fates for these species, and the researchers don't know why. *H. erectus* survived for nearly a million years more, but *P. boisei* went extinct a few lakh years after their lakeside sojourn.

— Arkatapa Basu

Professor Chris Stringer of London's Natural History Museum, with a *Homo erectus* skull, left, a cast of *Homo floresiensis*, centre, and the cast of a modern *Homo sapiens* skull in London. AP

For feedback and suggestions
for 'Science', please write to
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with the subject 'Daily page'

Saurashtra fossils say early humans didn't stick to coast as they migrated

Scientists know *Homo sapiens* evolved in Africa, then emigrated to different parts of the world, but they disagree over what routes the humans took and when. Several studies have supported the coastal dispersion idea – that migrating humans travelled along the coast. But the idea suffers an important flaw: no archeological evidence

Sayantan Datta

Genetic studies have painted a neat picture of human evolution and migration around the world. By studying how frequently DNA in the mitochondria (the cellular structure responsible for producing energy) mutates, scientists have found that *Homo sapiens* evolved in Africa for millennia, then emigrated to different parts of the world.

Scientists mostly agree on this out-of-Africa theory of human evolution and migration, but they frequently disagree on when exactly our ancestors migrated and what routes they took to different parts of the globe.

Several genetic studies have supported the coastal dispersion idea: that migrating humans travelled along the coast, especially in the tropics, where the weather was warm and wet and food was plentiful. In 2005, the mitochondrial genomes from 260 Orang Asli people revealed early humans dispersed rapidly around 65,000 years ago on the coast of the Indian Ocean before reaching Australia. In 2020, the nuclear and mitochondrial DNA from the remains of a 2,700-year-old individual in Japan showed a strong "genetic affinity" with indigenous Taiwanese tribes. The authors of the study concluded the finding supported coastal migration. Human settlements in the Andaman archipelago have also been linked to coastal journeys.

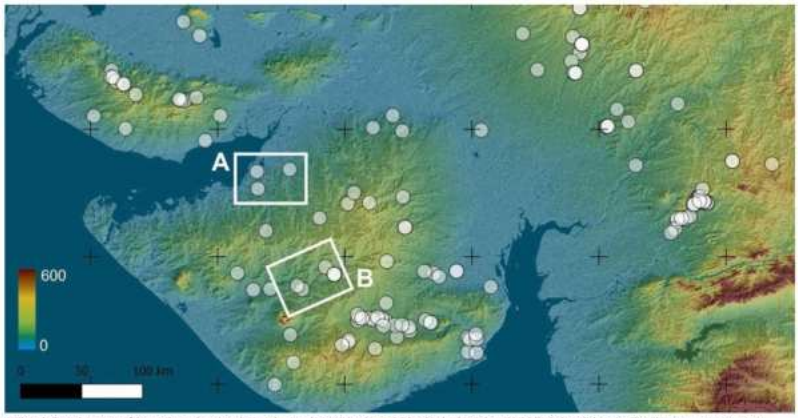
But there's a problem: archeological evidence has disagreed with the coastal dispersion model. For example, "all Palaeolithic archaeological sites in India are inland," Michael Petraglia, director of the Australian Research Centre for Human Evolution at Griffith University, said. Along with his team, Petraglia has studied several archeological sites in the country. "There is not a shred of archaeological evidence along the entire Indian Ocean coastline to support this model."

Instead, Petraglia deferred to the inland dispersal model: the idea that human ancestors took "more interior, terrestrial routes."

A new study of archeological sites in India's Saurashtra peninsula, published in the journal *Quaternary Environments and Humans* in October, has mounted yet another challenge to the coastal dispersion model.

Early humans in Saurashtra

In the study, scientists from the Max Planck Institute for Geoanthropology and the Tübingen University, Germany; the Maharaja Sayajirao University of Baroda, Vadodara; and the University of the Philippines investigated the Bhadar and Aji river basins of the Saurashtra peninsula in Gujarat. They discovered artefacts of tools made by early human inhabitants – pieces of chert, jasper, chalcedony, bloodstone, and agate that were chipped again and again to achieve a desired shape and size.



A digital elevation map of Saurashtra showing the study area (A is Aji basin and B is Bhadar basin) and Middle Palaeolithic site distribution. JHA ET AL. (2024)

The researchers used a method called relative dating to date these artefacts. In this method, archeologists first identify how deep in the earth an artefact was found. As older civilisations fall and newer ones replace them, the older artefacts become buried deeper. They are thus often found organised in layers. Based on the layer in which an artefact is found, researchers can figure out the layer's age from older studies that used more precise dating methods (a.k.a., absolute dating). In this way, the researchers estimated the artefacts found in the Aji and Bhadar river basins were 56,000 to 48,000 years old – around the Middle Palaeolithic age.

Among other things, this period is characterised by an advanced tool-making technique where humans flaked off small pieces from a larger oval piece of stone.

Coast v. hinterland

In 2013, British archaeologist Paul Mellars suggested human ancestors moved from Africa to Australia through coastal routes in the Late Palaeolithic age 40,000-10,000 years ago. If this was true for Saurashtra, the team would have found artefacts indicative of the Late Palaeolithic, particularly sharper blade-like tools. But the researchers

As civilisations fall, artefacts are buried deeper and are found in layers. Based on the layer the age can be deduced. Researchers estimate artefacts in the Aji and Bhadar basins were 56,000 to 48,000 years old – around the Middle Palaeolithic age

wrote in their paper that they found no such tools dating to the Late Palaeolithic. According to Petraglia, Mellars's hypothesis "was not based on any convincing archaeological evidence on the coast."

The researchers also drew on existing models of sea-level changes during the Middle Palaeolithic. From these models, they deduced "Saurashtra would have been a vast landmass connected to Kutch in the north, Makran in the northwest, and the Western Ghats in the southeast," according to their paper. In other words, the sites the researchers studied would have been much farther from the coast in the Middle Palaeolithic.

Together with the fact that other Middle Palaeolithic sites have been found in "central and peninsular India," the authors have suggested that human ancestors moved inland to disperse across the Indian subcontinent instead of sticking to the coast.

Petraglia also said that if the humans had indeed stayed on the coast, they would have depended on "marine resources like fish and shellfish" for food – whereas the current study found no such evidence.

Thus, it seems people arrived at the Saurashtra peninsula in the Middle Palaeolithic and explored the Indian landmass – both by dispersing away from the coast and using inland routes.

Beyond the debate

According to Shanti Pappu, visiting professor of archaeology at Krea University, Andhra Pradesh, the study's strength lies in providing new data from "an important region in Indian prehistory." At the same time, she said "precise dating must be done to confirm" the age of these artefacts, which the researchers also said in their paper.

Pappu, who is also secretary of the Sharma Centre for Heritage Education, agreed there is mounting evidence disputing a purely coastal migration of human ancestors, but she also advised caution: "debates on coastal movements for this time period are difficult to prove or disprove, owing to the lack of securely dated sites on the land and the submergence of other sites" due to the later rise in sea levels.

Like Pappu, Gyaneshwar Chaubey, a professor of biological anthropology at the Banaras Hindu University, said that the study is a prompt to move beyond the "debate on dispersal." "The current study highlights a broader expansion of Palaeolithic occupation in the Saurashtra region, encompassing coastal margins, hinterlands, and inland areas," he said.

(Sayantan Datta is a science journalist and a faculty member at Krea University. (dattasayantan95@gmail.com))

THE GIST

- Archaeological evidence disagrees with coastal dispersion. Researchers say, 'All Palaeolithic archaeological sites in India are inland,' and 'There is not a shred of evidence along the Indian Ocean coastline to support this model'
- Studies suggest that humans who arrived at Saurashtra moved inland, dispersing away from the coast. Further, there is no evidence of the utilisation of 'marine resources,' which would indicate coastal settlement
- Some researchers feel that though evidence disputes coastal migration, 'debates on coastal movements are difficult to prove or disprove, owing to the lack of securely dated sites on land and the submergence of other sites'

PM POSHAN: Centre to bear additional cost of ₹425.62 cr. due to food inflation

The Hindu Bureau
NEW DELHI

The Centre has announced that it will bear the additional cost of ₹425.62 crore on account of inflation in food material cost under the Centrally sponsored PM POSHAN Scheme in the financial year 2024-25.

Under the scheme, one hot cooked meal is served to 11.7 crore students studying in Balvatika and Classes 1 to 8 in 10.24 lakh government and government-aided schools.

On the basis of the inflation index provided by the Labour Bureau, the Education Ministry has enhanced the material cost of pulses, vegetables and oil by 13.7%.

"The material cost is enhanced from ₹5.45 to ₹6.19 for primary and Balvatika classes and from ₹8.17 to ₹9.29 for upper primary classes with effect from December 1," said a release from the Ministry. The material cost could not be revised during 2023-24; therefore, the inflation value of items under PM POSHAN basket for both 2022-23 (6.45%) and 2023-24 (6.74%) has been considered for enhancement of cost.

On the basis of the inflation index, the material cost of pulses, vegetables and oil have been enhanced by 13.7%. FILE PHOTO

Each Balvatika and primary school student is eligible for 20 grams of pulses, 50 grams of vegetables and five grams of oil. Similarly, each upper primary student is eligible for 30 grams of pulses, 50 grams of vegetables and seven grams of oil.

State contribution

The new rates will be applicable across all the States and Union Territories.

"These rates of material cost are the minimum mandatory rates; however, States and UTs are free to contribute more than their prescribed share, as some States and UTs have been contributing more than their minimum mandatory share from their own resources for providing meals with augmented nutrition under the PM POSHAN Scheme," the statement said.

The Centre also provides about 26 lakh tonnes of foodgrains through the Food Corporation of India for which it bears 100% cost, including subsidy of approximately ₹9,000 crore a year and 100% transportation cost from FCI depots to schools.

"The per meal cost after adding all components including foodgrains cost under the scheme comes to approximately ₹11.54 for Balvatika and primary classes and ₹16.74 for upper primary classes," the statement said.

Researchers develop AI-based platform to rapidly find age-defying molecules

Ramya Kannan
CHENNAI

AgeXtend also helps in understanding the biological mechanism of compounds, says one of the scientists

Longevity has always been the Holy Grail of medicine, and extending life beyond its conceivable end has driven kings, researchers and pharma companies alike through a roller-coaster ride that invariably stops at ground level; no wonder the search continues. Now, it is an Indian group from the Indraprastha Institute of Information Technology, Delhi, that has used a platform based on Artificial Intelligence to discover molecules that promote healthy ageing.

Researchers at IIIT-Delhi have developed AgeXtend as a tool to efficiently cut down the time taken to identify viable molecules with geroprotectors, or age defying properties, through conventional research. The authors who have published the experiment in a recent issue of *Nature Aging*, have said that they screened over 1.1 billion compounds, over a period of two years, and the platform had uncovered several promising candidates validated through experiments on yeast, worms (*C. elegans*), and human cell models. A fraction of them, less than 1%, have been identified with anti-ageing properties.

Gautam Ahuja, one of the authors, from the department of Computational Biology, IIIT- Delhi, says, "AgeXtend uses AI to predict and identify compounds with anti-ageing properties, assess their safety, and understand their biological effects. It looks at the structure of new molecules and can predict accurately if they have geroprotective characteristics. But where this product diverges from others that might already have been employed by researchers is that it can explain why it considers certain compounds as anti-ageing, it reveals why it chose these components – the mechanisms. This will help to guide further research and indicate the particular direction in which validation needs to proceed."

How exactly does it work? "The chemical space is like a universe, and I do not know the coordinates for my intended destination. What AgeXtend does is to serve as the GPS, pointing out to us where exactly we need to go," Dr. Ahuja explained. Apparently, it had successfully identified the benefits of well-known molecules like metformin and taurine, even without prior knowledge of these compounds, he added.

IIIT-D Ph.D. scholar Sakshi Arora who is also the lead author in the journal paper, described AgeXtend as "a discovery engine unlocking new possibilities for promoting health and longevity."

Scanning 1.2 billion molecules makes this the largest study so far on the subject, Dr. Ahuja claimed. Candidates scanned included compounds from commercial drugs, Chinese drugs, ayurveda and molecules approved by the FDA.

The research team has made available its code and data on open source on the website, free for researchers and students, and at a charge for companies.

A Python package for AgeXtend is provided via pip at pypi.org/project/AgeXtend

Ecologist Madhav Gadgil gets Champions of the Earth award

The United Nations on Tuesday recognised ecologist Madhav Gadgil with the annual Champions of the Earth award, the UN's highest environmental honour, for his seminal work in the Western Ghats. Mr. Gadgil, the only Indian on the list of this year's award recipients, chaired the government-constituted Western Ghats Ecology Expert Panel to study the impact of population pressure, climate change, and development activities on the ecologically fragile region in India. The panel recommended in 2011 that the entire hill range be declared an Ecologically Sensitive Area (ESA) and divided it into three Ecologically Sensitive Zones. PTI

‘Mental health, cybercrimes, climate change are threats to human rights’

The Hindu Bureau
NEW DELHI

President Droupadi Murmu on Tuesday said that business leaders must ensure the growing gig economy did not adversely impact the mental health of gig workers. Speaking at an event organised by the National Human Rights Commission (NHRC) on Human Rights Day, she described cybercrimes and climate change as new threats to human rights, and emphasised the need to ponder the use of Artificial Intelligence (AI), which has both good and bad impacts on human lives.

“Cybercrimes and climate change are new threats to human rights. The digital era, while being transformative, has also brought with it complex issues such as cyberbullying, deepfakes, privacy concerns, and the spread of misinformation. These challenges underscore the importance of fostering a safe, secure, and equitable digital environment that protects the rights and dignity of every individual,” the President said.

Droupadi Murmu during an event organised by NHRC on Human Rights Day in New Delhi on Tuesday. PTI

Emphasising the importance of mental health, the President appealed to all stakeholders to initiate adequate measures to reduce the stress affecting this section of society.

She further urged business leaders to ensure that the growing gig economy did not adversely impact the mental health of gig workers. “As we adopt new economic models, we must ensure that the well-being of all individuals, especially those in vulnerable sectors, remains our priority. We must all work towards removing any stigma associated with mental illness, creating awareness, and helping those in need,” Ms. Murmu said.

The President also stressed the need to examine the issue of climate change.

“Polluters of a different place and a different era are affecting the lives of people in another place and another period. India has rightly taken up the leadership in climate action. The government’s initiatives, such as the 2022 Energy Conservation (Amendment) Bill, the Green Credit Initiative, are clear demonstrations of India’s commitment to building a clean planet for future generations,” she said.

Pointing out that India had an elderly population of around 150 million by 2022, which is projected to reach 350 million by 2050, the President said that it was imperative policies were formulated to preserve the dignity and ensure the well-being of the elderly, empowering them to live full lives as valuable members of society.

NHRC Acting Chairperson Vijaya Bharathi Sayani, in her welcome note, said that Human Rights Day served as a powerful reminder of the fundamental rights inherent to every individual, irrespective of their identity or background.

“In this era of rapid change and complex social dynamics, the role of the NHRC, India has never been more critical. We remain committed to advocating for the rights of marginalised communities through significant national and international initiatives, striving to build a society where everyone can enjoy their fundamental freedoms, free from fear or discrimination,” President Murmu said.

India Skills Report ranks Kerala among top States for employability in India

Sarath Babu George
THIRUVANANTHAPURAM

Kerala continues to lead as one of the most employable States in India, as indicated by the India Skills Report 2025.

The report, published by talent assessment agency Wheebox in association with various agencies including the All India Council for Technical Education, Confederation of Indian Industry, and Association of Indian Universities, reveals that Kerala's workforce maintains a strong employability rate of 71%, placing it on the fifth position after Maharashtra, Delhi, Karnataka and Andhra Pradesh.

Kerala joins ranks of T.N., Maharashtra and U.P. as the top States favoured for employment

Kerala also joins the ranks of Tamil Nadu, Maharashtra and Uttar Pradesh as the top States favoured for employment across India. The State is especially preferred by female job aspirants.

The study, which surveyed 6.50 lakh youths through a Global Employability Test conducted across the country, indicated that the overall employability in India continued to grow with 54.81% of the assessed youths found to be employable with the required skills.

Kerala's employability figures highlight its significant talent pool, particularly among the youth. In the 22-25 age group, Kerala has an employability rate of 87.47%, making it one of the top contenders in this demographic, while for experienced professionals aged 26-29 Kerala ranked the highest with an employability rate of 68.82%.

The State stands out in terms of female employability, ranking third among States with significant opportunities for women.

Pinarayi, Stalin to come together for launch of Periyar memorial in Vaikom tomorrow

The Hindu Bureau
KOTTAYAM

Over one-and-a-half years after jointly inaugurating the centenary celebrations of the Vaikom Satyagraha, Kerala Chief Minister Pinarayi Vijayan and Tamil Nadu Chief Minister M.K. Stalin are set to reunite in the backwater town of Vaikom.

According to Cooperation Minister V.N. Vasavan, the two will come together at Vaikom on Thursday to inaugurate the renovated memorial of Tamil reformist E.V. Ramasami Naicker, popularly known as Thanthai Periyar.

While Mr. Stalin will inaugurate the renovated memorial, Mr. Vijayan will preside over a public function in connection with the event. K. Veeramani, president, Dravidar Kazhagam, will be the chief guest. An array of Ministers from both States and leaders from Tamil Nadu's Erode and Tirupur districts are likely to participate.

Honouring a hero: The renovated memorial of Thanthai Periyar at Vaikom, which will be inaugurated on Thursday. VISHNU PRATHAP

Vaikom Satyagraha, recognised as the first organised movement for the rights of the 'untouchable' communities in 1924, was aimed at securing access to public roads leading to the Sri Mahadeva Temple at Vaikom. Periyar, along with his wife Nagamma, too joined the satyagraha. He was jailed twice for his involvement.

Major renovation

The decision to renovate the memorial site was made by Mr. Stalin when he visited Vaikom in April last year as part of the Vaikom Satyagraha centenary celebrations.

The 70-cent property near Valiyakavala Junction had been officially transferred to Tamil Nadu in the early 1980s. Though a memorial was established in January 1994, it later suffered years of neglect.

The memorial has now undergone an extensive renovation at a cost of ₹8.14 crore. The original museum, which housed paintings and artefacts related to Periyar, was partially demolished to make way for a two-storey structure. The ground floor now features an upgraded museum, while the upper floor serves as an administrative office.

A grand entrance gate has been constructed near Periyar's statue, with a newly built library adjacent to it. The museum features a wealth of materials, including Periyar's biography, the history of the Dravidian movement, images of his interactions with prominent leaders, and copies of his writings.

The Periyar statue, originally installed in 1985 on 84 cents of land provided by the Kerala government, remains a centrepiece of the memorial.

ISRO, Navy carry out recovery trials for Gaganyaan mission

The Hindu Bureau
BENGALURU

The Indian Space Research Organisation (ISRO) with the Navy successfully carried out the well deck trials of the Gaganyaan missions' crew module.

The trials were carried out at Eastern Naval Command on Friday using well deck ship off the coast of Visakhapatnam.

According to the ISRO, the well deck in a ship can be flooded with water so that boats, landing crafts, and recovered spacecraft can be taken inside to dock within the ship.

'Least discomfort'

"Once the crew module touches down in the sea at the end of the mission, the crew have to be recovered in the minimum possible time and with the least discomfort. One of the preferred options is to tow the crew module along with the crew inside the well deck of the ship where the crew can come out comfortably," the agency said on Tuesday.

The ISRO and the Navy carry out the recovery trials of the crew module for the Gaganyaan mission. SPECIAL ARRANGEMENT

It further said that the trials for carrying out well deck recovery were carried out using a mass and shape simulated crew module mock-up. "The sequence of operations for well deck recovery of crew module was carried out by the Indian Navy and the ISRO during the trials. The sequence includes the attachment of the recovery buoy, towing, entering into the well deck ship, positioning of crew module on the fixture, and draining of the well deck," it said.

It said this trial validated the overall sequence of operations, ground fixtures and will help in fine tuning Standard Operating Procedures (SOPs). "This trial is part of the series of recovery trials being carried out by the Indian Navy and ISRO to finalise the SOPs for recovery operations for nominal as well as off-nominal conditions," the ISRO said.

The Gaganyaan programme envisages demonstration of human spaceflight capability by launching a crew of three members to an orbit of 400 km for a three-day mission and bringing them back safely to Earth by landing them in sea waters.

INBRIEF

JMM's Rabindra Nath Mahato elected Jharkhand Speaker

Jharkhand Mukti Morcha (JMM) MLA Rabindra Nath Mahato was elected Speaker of the Jharkhand Legislative Assembly on Tuesday during the special session which began on December 9. The Nala MLA is the first leader to be elected Speaker for the second consecutive term. Chief Minister Hemant Soren proposed the name of Mr. Mahato and JMM MLA Mathura Prasad Mahato seconded the motion. Pro-tem Speaker Stephen Marandi conducted the vote through voice vote, and Mr. Mahato's name was unanimously supported by all.