

Gaganyaan: parachutes for re-entry capsule sent to ISRO facility in Bengaluru

The Hindu Bureau
NEW DELHI

Indigenously developed parachutes for the safe return of the capsule that will carry astronauts under the proposed Gaganyaan programme are set to undergo fitment tests at an Indian Space Research Organisation (ISRO) facility in Bengaluru in July.

The Aerial Delivery Research and Development Establishment (ADRDE), the Agra-based laboratory under the Defence Research and Development Organisation (DRDO), has developed the parachutes for India's manned space flight programme, Gaganyaan, which envisages putting a crew of three astronauts in low-earth orbit.

On Saturday, the flight unit of the parachutes was flagged off from ADRDE to the ISRO Satellite Integration and Testing Establishment in Bengaluru.

"The first test demonstration is likely to take place in July this year, with the first unmanned mission



The Gaganyaan crew module will carry three astronauts as part of India's first human space flight programme. FILE PHOTO

to be undertaken only after the success of two such demonstrations," the ADRDE said in a statement. The Test Vehicle Demonstration (TVD-1) flight will be a significant milestone toward realising the nation's ambitious Gaganyaan programme, it stated.

The parachute configuration consists of 10 parachutes. During flight the sequence starts with deployment of two parachutes of "apex cover separation parachute", which is protection cover for the crew module parachute compartment, followed by two more of "drogue para-

chute deployment" to stabilise and bring down the velocity. Upon the drogue parachute release, three parachutes of the "pilot parachute" system will be used to extract three parachutes of the "main parachute" individually, to reduce the speed of the crew module to safe levels during its landing, the statement explained.

Stating that each parachute's performance must be evaluated by complex testing methods, the ADRDE said that individual parachutes have undergone sub-system level testing.

Groundwater exploitation is silently sinking the ground beneath India's feet

Jacob Koshy

NEW DELHI

Cracks in buildings and 'sinking' land in Joshimath, a hill town in Uttarakhand, made the headlines earlier this year. A similar phenomenon has been playing out for years in the plains of Punjab, Haryana, Delhi and Faridabad. The unlikely culprit is excessive groundwater extraction.

Agricultural practices in northwest India are heavily dependent on groundwater withdrawal. With limited monsoon rain, the groundwater table is precariously low, show data gathered for years by the Central Ground Water Board (CGWB).

In Punjab, for instance, 76% of the groundwater



Source of worry: Farmers survey a dry well, once a major irrigation source, in Fatehpur village of Patiala district in Punjab. FILE PHOTO

blocks are 'over exploited'. In Chandigarh it is 64% and about 50% in Delhi. This means that more groundwater than can be recharged is extracted.

"Over time, when the underlying aquifers (deep water channels that are stores of percolated water)

aren't recharged, they run dry and the layers of soil and rock above them start to sink," Prof. Dheeraj Kumar Jain of the Indian Institute of Technology (Indian School of Mines), Dhanbad, said.

Mr. Jain, whose core research interests lie in min-

ing and minerals, said digging operations that were carried out hundreds of metres below the ground for coal, oil and gas through the years had shown examples of 'soil settlement,' or the soil sinking in to fill voids created from mining.

"From here we surmised that if oil and gas extraction cause subduction (sinking), then surely groundwater also ought to be playing some role. We found such instances in several parts of the world and that motivated some of my students to assess the situation in India, particularly the National Capital Territory."

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Groundwater the cause of sinking grounds

The CGWB, a subsidiary body of the Jal Shakti Ministry, is tasked with assessing the state of India's groundwater resources. It has a system of groundwater observation wells and monitors water levels four times a year. It, however, does not analyse the consequences of 'over exploitation'.

"The link between excessive groundwater extraction and land subsidence only started to become clear thanks to data from the GRACE (Gravity Recovery and Climate Experiment) satellites that could measure minute changes in gravity on different parts of the earth's surface," V.K. Gahlaut, chief scientist, National Geophysical Research Institute (NGRI), Hyderabad, said.

Mr. Gahlaut earlier published a research paper linking groundwater extraction to subsidence in Gandhinagar, Gujarat, an evidence that the issue was not specific to north India alone. "Unlike land movement from landslips or earthquakes, subsidence from groundwater extraction was gradual and barely visible annually. So, it is harder to correlate with structural damage," he added.

However, a wealth of studies in recent years, all of them obtained from satellite-based analysis of ground movement, from institutions and researchers that specialise in satellite-data analysis have correlated building deformities with groundwater withdrawals.

Kapil Malik, a research scholar who worked with Mr. Jain and runs the Noida-based Radar System and Services, used data from the Sentinel-1 satellite (different from GRACE) to show that from 2011-2017, the National Capital Region (NCR) sunk, on an average, 15 mm per year. Urbanisation and unplanned growth were major factors, said Mr. Malik and this exacerbated groundwater withdrawal. Parts of Delhi-NCR that saw subsidence were far away from tectonic (earthquake-linked) fault lines.

"We have also observed that Dwarka in Delhi, which saw subsidence, actually saw a reversal when aquifer levels were charged following rain-water harvesting practices that were implemented," Mr. Malik said.

Instances of structural damage were noted in Dera Bassi, Landran, Singhpura in Punjab, and Ambala in Haryana, according to a study published in 2021 by scientists at the Indian Institute of Remote Sensing, Dehradun, who reported land subsidence of nearly 7-12 cm per year and groundwater extraction rates of 46 cm to 236 cm annually.

Short films on waste management released

The Hindu Bureau
CHENNAI

Minister for Municipal Administration and Water Supply K.N. Nehru on Saturday released four short films on solid waste management and waste segregation.

The four films are *Your Trash Your Responsibility*, *Do Not Sin, My Trash My Responsibility* featuring actor Yogi Babu and *My Place My Responsibility*.

Cleanliness campaign

"The Clean People's Movement was launched in

June last year by Chief Minister M.K. Stalin to clean up the cities and make them garbage-free and related activities are being conducted on the second and fourth Saturdays every month," said the Minister.

The short films are an

extension of this programme.

The Minister spoke about the aim of the Swachh Bharat 2.0 Mission to make cities open defecation free and said the government was making toilets available to aid this.

National Lok Adalat in T.N. settles 80,655 cases, awards over ₹420 cr.

1,489 cheque dishonour cases, 1,912 motor accident compensation claims and 119 matrimonial disputes settled, says State Legal Services Authority secretary Nazir Ahmed; over 442 benches were constituted across the State for the purpose

The Hindu Bureau
CHENNAI

This year's second National Lok Adalat conducted in Tamil Nadu on Saturday ended up settling 80,655 cases and awarded ₹421.70 crore, according to a press communique issued by Tamil Nadu State Legal Services Authority (TNSLSA). This was achieved by constituting 442 Lok Adalat benches across the State.

Acting on the directions of the National Legal Services Authority (NALSA) which had fixed dates for conduct of four national-level Lok Adalat this year, TNSLSA constituted 434 benches at the district and taluk level to take up motor accident claims, cheque dishonour cases, civil cases, matrimonial disputes



Resolving disputes: Justice R. Mahadevan, second from left, chairman, Madras High Court Legal Services Committee, oversaw the conduct of National Lok Adalat at the Madurai Bench of the High Court on Saturday. SPECIAL ARRANGEMENT

and labour disputes for settlement.

Similarly, the Madras High Court Legal Services Committee led by its chair-

man Justice R. Mahadevan constituted four benches at the principal seat of the High Court in Chennai and three more Lok Adalat

Madras High Court Legal Services Committee secretary said the court's seven Lok Adalat benches settled 63 cases and awarded ₹8.21 crore

benches at the Madurai Bench of the High Court. One additional bench was constituted at the State Consumer Disputes Redressal Commission.

Pre-litigation cases

The seven Lok Adalat benches in the HC were presided over by sitting judges of the court.

They, along with the district and taluk level benches, ended up settling 55,779 pre-litigation cases leading to an award amount of ₹31.60 crore

and 24,876 pending cases leading to an award amount of ₹110.10 crore.

Providing the break up, TNSLSA secretary A. Nazir Ahmed stated that 1,489 cheque dishonour cases; 1,912 motor accident compensation claims; 794 civil cases; 119 matrimonial disputes (except divorce) and 38 labour disputes were settled amicably and that 605 of those cases were more than five years old.

Madras High Court Legal Services Committee secretary K. Sudha said, the court's seven Lok Adalat benches led by Justices Sunder Mohan, K. Kumar Babu, P.B. Balaji and K. Govindarajan Thilakavadi in Chennai and Justices S. Srimathy, K.K. Ramakrishnan and S. Ananthi in Madurai settled 63 cases and awarded ₹8.21 crore.

A break in the Western Ghats



SPEAKING OF SCIENCE
D. Balasubramanian

Often called as a significant discontinuity in the Western Ghats, the Palghat Gap is about 40 km wide, with the steep Nilgiris and Anamalai hills, both rising above 2,000 msl, on either side.

The Palghat Gap has historically been important as a significant gateway into the State of Kerala.

It is a corridor for both roads and railways that connects Coimbatore with Palakkad. The Bharathappuzha river flows through it.

In contrast to the tropical rainforests of the Western Ghats, the vegetation in the Palghat Gap is classified as dry evergreen forest.

It also marks a divide in the flora and fauna of the region. For example, several species of frogs are found only on one

side of the Palghat Gap.

Geological upheaval

The Gap is a geological shear zone that runs from east to west. Shear zones are weak regions in the earth's crust – this is the reason why tremors are sometimes felt in Coimbatore.

The origin of the Palghat Gap also stems from the drift of continental shelves after Australia and Africa broke off from the Gondwana landmass.

India and Madagascar remained as one landmass until large-scale volcanic activity split the two, the split occurring where the Palghat Gap is located – this is mirrored in the Ranotsara Gap on the eastern face of Madagascar. How long ago did the Gap originate? The landmass split about 100 million years ago, and the Gap had formed before this; although how long before is debated.

It has been speculated that one reason for the biogeographic distinctions in species



Variation: There are biogeographic distinctions in species north and south of the Palghat Gap. FILE PHOTO

in north and south of the Gap could be due to an ancient river or an incursion of the sea in the distant past. Elephant populations on the Nilgiris side differ in their mitochondrial DNA from elephants in the Anamalai and the Periyar sanctuaries.

One study from IISc Bangalore has analysed DNA sequence divergence data in populations of the White-bellied Shortwing, an endemic and threatened bird. Birds found around Ooty and Baba

Budan are called the Nilgiri blue robin; the Anamalai group differs slightly in appearance, and is called the White-bellied blue robin.

South of the Gap

The biodiversity of a region is expressed in two ways: species richness, which relates to how many species are found in an ecosystem, and phylogenetic diversity, where you add up the evolutionary age of all the species you find.

Both these traits are abun-

dant in the Western Ghats south of the Palghat Gap, as reported in a recent study by groups from the CCMB at Hyderabad and other institutions (*Proceedings of the Royal Society B*, April 2023). There are over 450 species of trees here, including some such as *Magnolia champaca* (Champa; Tamil: Sambagan) that have been around for over 130 million years.

Warm weather due to proximity to the equator, and moist air brings plenty of rain to the southern Western Ghats. Therefore, this region has been an island refuge for all forms of life, even as cycles of ice ages and droughts have reduced biodiversity in surrounding areas. The Western Ghats in north of the Palghat Gap receive more rain annually, but the south gets rain more evenly throughout the year.

(The article was written in collaboration with Sushil Chandani, who works in molecular modelling. sushilchandani@gmail.com)

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