gobar times

A DOWN TO EARTH SUPPLEMENT FOR THE YOUNG AND CURIOUS

ISSUE NO: 257, October 1–31, 2023

Up above the world so high...

An enthralling space odyssey to our very own Moon and Sun via missions unravelling their secrets and reporting their mysteries

Readers-Writers

Recalling the Talisman

On the occasion of Gandhi Jayanti, here are some lessons drawn from the Mahatma on how we can live better.

Jayanta Topadar

I believe that our greed is like a serpent of dissatisfaction and restlessness. It bites our conscience and blindfolds us, leading us towards an uncontrollable *maya* (meaning, illusion in Sanskrit) of being materialistically superior in the society. It's not easy to confess but the bitter truth is that many of us compete to acquire more wealth and comfort in this so-called 'jungle' of life. Here, very peculiarly and callously, success is judged by an individual's rise in outwardly riches. So, if that is the criteria of measuring progress, then, one must look at Mahatma Gandhi and try to understand his universally relevant 'talisman'. It was about how one should avoid comparing his/her grief and weakness with other people's, and instead, reach the helpless and serve them as we would serve the *eshwar* (god).

Bapu had rightly assured, "You must not lose faith in humanity. Humanity is an ocean; if a few drops of the ocean are dirty, the ocean does not become dirty." So, irrespective of how our world today is troubled with hatred and jealousy, it is our duty to be honest within and behave non-violently—verbally as well as in action. In fact, I am sure, the ideology and philosophy of Mahatma Gandhi can only make everything alright else no good will prevail amidst all the negativity of this ever-growing, cut-throat competition around the globe.

Our world has become a jigsaw puzzle of thoughts and words where people are always running short of time regarding their moral responsibilities especially towards the earth, the environment—the flora, fauna, and all living beings. It is our societal role and contribution which will determine our bona fide success—matchless and inspiring, sans any question of the desire for aristocratic comforts. Therefore, let's revive the Gandhian principles in our day-to-day dealings.

The Mahatma had opined, "The greatness of humanity is not in being human but in being humane." So, let's come and make this world a better place to live with all the *tyag* (sacrifise) and *tapasya* (penance)! Let us take a *sankalpa* (vow) of never becoming self-centered or becoming a mere bread-earner but becoming a genuine human being.

> **"Earth provides enough to satisfy every man's needs, but not every man's greed.** Mahatma Gandhi

Time is precious so we all should save this world by restoring humanity at the earliest. In this way, all our miseries will be replaced by a strengthened spirit of humanity. On this Gandhi Jayanti, let us draw motivation from Bapu's true belief: "A man is but the product of his thoughts. What he thinks, he becomes."

The author is a Sikshak Karyakarta and teaches English, General Knowledge, and Purana Vidya in classes 3–6 at the Vivekananda Kendra Vidyalaya, Khatkhati, Karbi Anglong District, Assam.

Supplement Editor: Souparno Banerjee **Senior Creative Director:** Ajit Bajaj **Copy:** Anubhuti Sharma **Design:** Ritika Bohra
Illustrations: Yogendra Anand **Cover Design:** Ritika Bohra, Yogendra Anand **Production:** Rakesh Srivastava, Surender Singh
Email: young@downtoearth.org.in **Snail Mail:** 41, Tughlakabad Institutional Area, New Delhi–110062

Cover Story

Minutes after Chandrayaan-3, India's Moon mission, was launched, it sent a special request to the *Gobar Times* (GT) satellite. It requested GT to connect it with Aditya-L1, which was gearing up for its trip towards the Sun.
Excerpts:

Chandrayaan-3: Hi, Aditya-L1! I am Chandrayaan-3, India's third spacecraft to the Moon. I just lifted off from Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh. The Indian Space Research Organisation (ISRO) programmed my take-off precisely on 14th July 2023 so I'm off to the Mooooonnn...! Wish you luck for your expedition to the sun and I hope we can update each other through our space odysseys...

Aditya L1: Hi, Chandra! Thanks for getting in touch. Am still on Earth. I am ISRO's first attempt to observe the Sun. I wish you luck, too! Hope everything goes well!

Chandrayaan-3: Soooooo... good to hear from you, Adi! It's 20th July and I'm still orbiting our Mother Earth. The rocket that propelled me wasn't powerful enough. So, ISRO has commanded me to use the Earth's gravity to slingshot through space into the Moon's orbit. Once I enter the lunar orbit, I'll use the Moon's gravitational pull to inch closer to its South Pole and make my descent. Do you know that this polar region is quite unexplored and mysterious?

On-route to our Celestial Neighbours

The Moon & Sun Unveiled

A spellbinding narrative of India's famed missions to the Moon and Sun reimagined as two chatty kids, texting about their adventures in the unknown space

Rohini Krishnamurthy

Cover Story

Aditya L1: Well, your rocket might be a humbler one as ISRO is using a cost-effective methodology, given its modest budget of ₹650 crores. But, what's the South Pole like!?

Chandrayaan-3: True that. Well, the South Pole has deep craters, much deeper than the North Pole, and they do not receive any sunlight. In fact, some of them haven't seen sunrays in billions of years! Temperatures in the lunar South Pole are as low as -203°C and, during sunlit days, they soar to as high as 54°C!

Also, previous satellite missions, including my predecessor, Chandrayaan-1, have received strong evidence that there could be large reserves of ice deposits in these craters. And ice means W...A...T...E...R...!!!

Most previous missions, like the United States' Apollo and USSR's Luna, have landed around the Moon's equator. (*Guys! Find out what's USSR quickly!*) But it's the South Pole, which is clearly outstanding because of its magical ice. If I make a successful landing over there, India will become the first nation to do so. Though Russia's Luna-25, which is also targeting the South Pole, is likely to be the flag-bearer if it succeeds.

Aditya L1: Whoa!!! That's so thrilling! So, does water mean LIFE!???

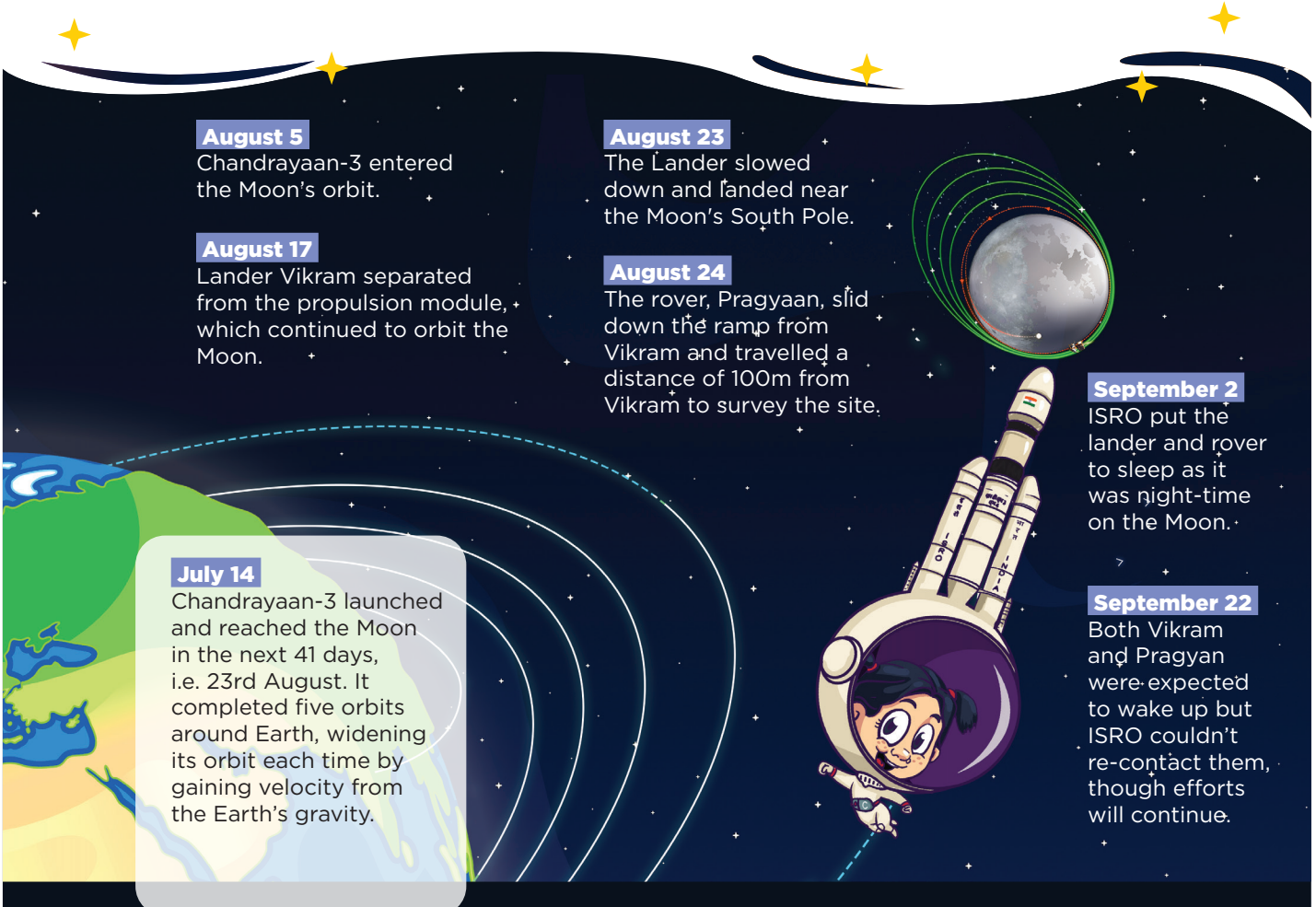
Chandrayaan-3: Haha! The presence of water means that future space explorers could use this water for drinking. And if we split it into hydrogen and oxygen molecules, then we could use the hydrogen to fuel our operations to Mars and beyond, and the oxygen to blow life into the air we'd breathe.

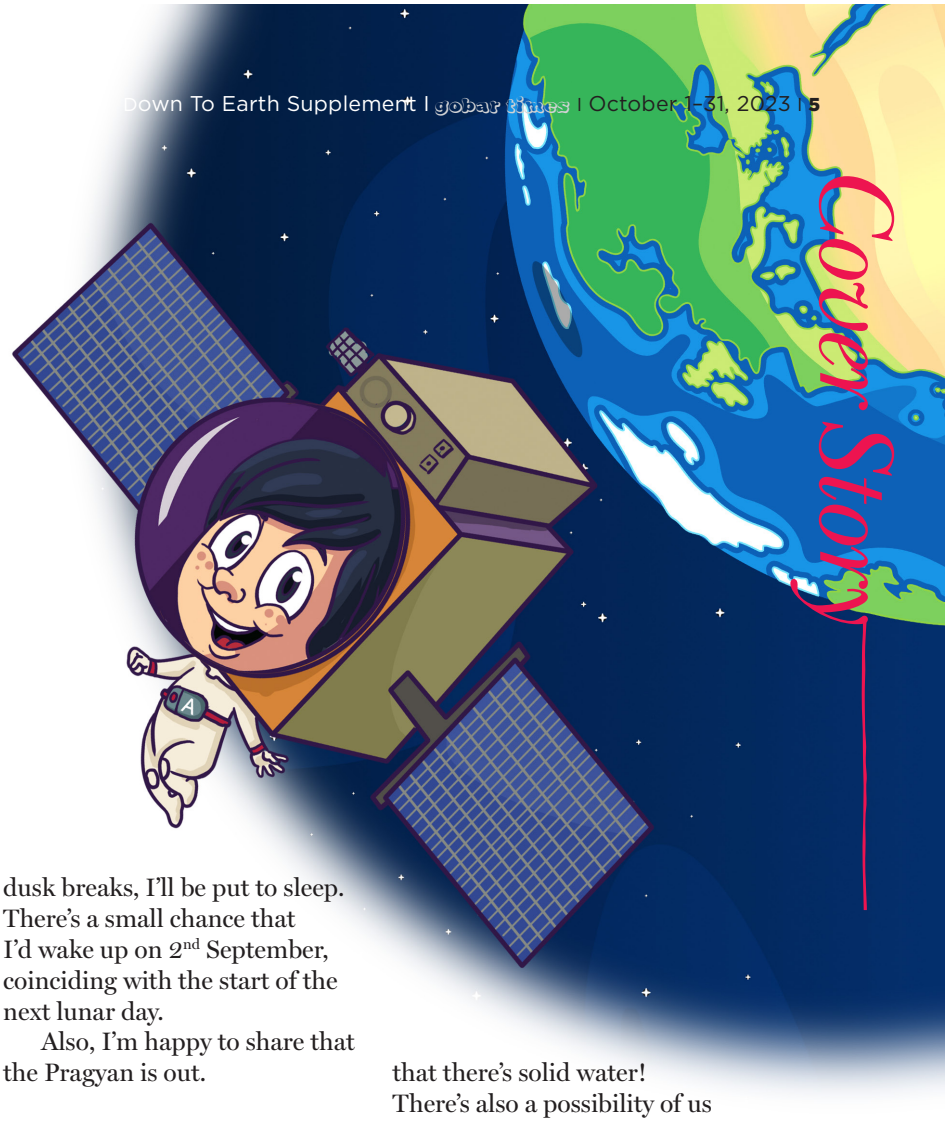
On a different note, I reached the Moon's orbit on 5th August. When are you departing?

Aditya L1: Congratulations! Sometime in September, I think. I'll be heading to the Lagrange point L1, which is just 1 per cent of the Earth–Sun distance. This is a region in space where the gravitational forces of the Earth and the Sun cancel each other. This'll help me orbit the L1 point with minimal fuel requirement.

So, now that you're closer to your dream destination, what'll you do once you reach? What're your mission goals?

Chandrayaan-3: My foremost goal is to prove that ISRO's Lander Vikram can indeed successfully accomplish a soft





landing. Then, am carrying a rover named Pragyan in my belly, which should be able to walk near the landing site. And then both Vikram and Pragyan are carrying some instruments to conduct experiments—for recording temperatures, elements, and minerals to measuring seismicity and quakes.

I'll be attempting this destined landing on 23rd August. Fingers-crossed!

Aditya L1: Hey, Russia's Luna-25, I learnt, failed to make its landing. Gosh! All eyes are on you now but don't worry. It'll be an extremely tense moment for you, given that Chandrayaan-2 failed to land. By the way, what went wrong then?

Chandrayaan-3: Thanks, *yaar*! My predecessor suffered a software glitch. So, ISRO tested me in every possible scenario to ensure no failures now.

Aditya L1: Best of Luck!!!

Chandrayaan-3: "India, I reached my destination, and you too!" I just messaged ISRO at 6:04pm on 23rd August! I've landed safe and sound near the South Pole, Adi! With this, India has become the first country to accomplish this momentous feat.

Aditya L1: This is truly a historic moment, Chandra!!! Tons of congratulations!!! How's everything there?

Chandrayaan-3: Thank you, thank you!!! It's daytime on the Moon right now and 1 Lunar Day = 14 Earth Days. So, I'll stay active through this time, during which, I'll conduct my experiments. And after the dusk breaks, I'll be put to sleep. There's a small chance that I'd wake up on 2nd September, coinciding with the start of the next lunar day.

Also, I'm happy to share that the Pragyan is out.

Aditya L1: Great! Well, I'm being launched from Sriharikota too and also on 2nd September. So far, only Japan, the US, Europe, and China have dispatched solar missions.

Chandrayaan-3: That's an amazing news. How long will it take you to reach L1?

Aditya L1: About 126 days. I'll first reach the low Earth orbit and then exit the Earth's gravitational Sphere of Influence. It's an imaginary boundary, beyond which the Earth's gravitational pull dominates that of the Sun. Then I'll make my way towards L1. Meanwhile, did you find anything interesting on Moon?

Chandrayaan-3: Yeah! I've detected sulfur, which indicates that there's solid water! There's also a possibility of us using sulfur to make amino acids and proteins, which are the cornerstones of any lifeform. Further, preliminary search revealed the presence of aluminium, calcium, iron, chromium, titanium, manganese, silicon, and oxygen.

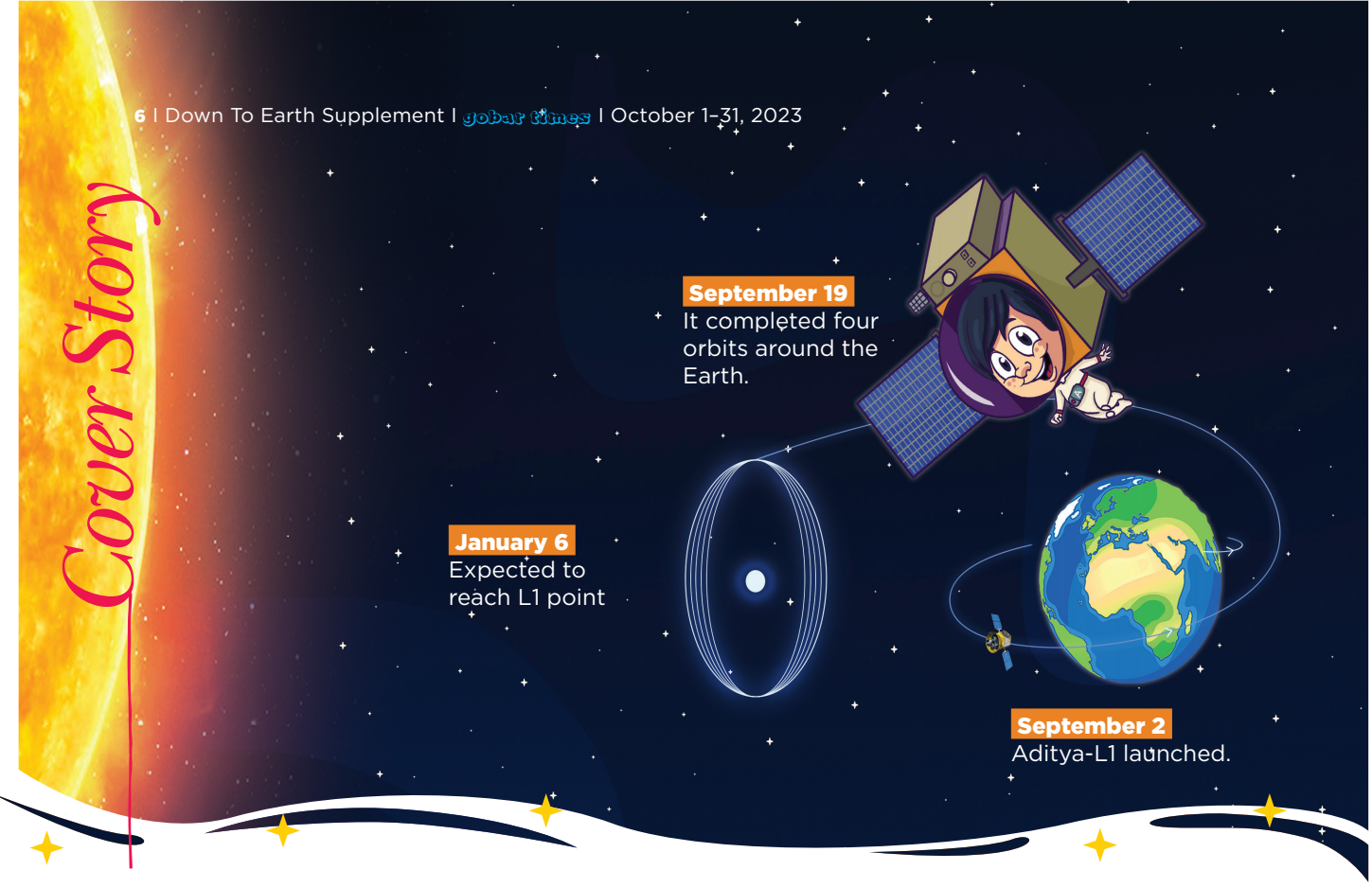
I've also noted vibrations from a seemingly natural seismic activity. We're yet to identify the source. This is just preliminary data. More analysis needs to be done.

Also, it's 2nd September—you must've taken off and I'll be put to sleep today. I forgot asking what all do you plan to do there.

Aditya L1: I'll be studying the sun and space weather.

Chandrayaan-3: Ah! The Sun predominates space weather, right?

Cover Story



Aditya L1: Yup! Despite being 150 million kilometers away, the Sun majorly affects the Earth and the rest of the Solar System. The space weather is important for research as radiation, heat, magnetic fields, and a constant flow of particles from the Sun impact the Earth.

Do you know that back in 1859, there was a disruption of telegraph services because of a solar storm? (*Google all this to know more!*) Such solar events can damage our satellites too. So, ISRO has designed me to investigate these solar activities and how they impact space weather in real-time.

Also, the Sun is known for its explosions, comprising plasma and magnetic fields, thrown out at high speeds. They are called Coronal Mass Ejections or CMEs.

The CMEs usually take 8–10 hours to reach the Earth. Piyali Chatterjee, Associate Professor at the Indian Institute of Astrophysics, involved with my mission told me that the data I collect could enable space weather prediction in future. If we accomplish this, we'll be able to save our satellites and all that is dependent upon them, which is literally our whole world!

Chandrayaan-3: I heard CMEs significantly knock the radio systems on Earth? (*Hehe... not your Radio FM! Look up this as well*).

Aditya L1: Yes, severe CMEs can spoil radio communication as they hit the Earth's ionosphere. It's a layer of our upper atmosphere, made up of electrons, and sits at 80–600 km above the Earth's surface. Radio waves travel in this ionosphere. Solar particles, present here, can affect radio signals and make them noisy.

This could be dangerous mid-flight as pilots depend upon radio waves to coordinate with ground stations. GPS, which helps *Gobar Times* followers to navigate on Earth, could also malfunction.

Chandrayaan-3: That's scary... I'm feeling a bit drowsy, Adi. Going off to sleep! Let's try reconnecting on 22nd September.

Aditya L1: It's the 19th on Earth. I've completed five orbits around our Blue Planet and set off on my voyage to point L1. You there?

Aditya L1: Psst! It's the 22nd September; we're all waiting to hear from you again, Chandra. I really hope you'll reply soon!...

Aditya L1: Oh! I just got a GT update that ISRO couldn't reconnect with you. Aww... I wanted to tell you that I'm proud of you for leaving a mark on the Moon, hoisting our flag, and becoming a permanent lunar ambassador. I'll keep pinging you and hope that my messages will get delivered to you some day. Until then, happy journey!

The author is a Senior Reporter for Down To Earth magazine.

Readers-Writers

Truckloads of Coal

A citizen's report from the dust-ridden pathways of Odisha, exposing the deterioration of roadways and poor people's lifeline to prosperity

Baijayanti Rout

Last year, around 22nd December 2022, I was watching some *Odisha Television News*. "I want the transportation of coal to end permanently," said Binati Mahanta vociferously, a 38-year-old, homemaker from the Other Backward Class. She belonged to one of the eight panchayats in the Tomka region, falling within the Jajpur district of Odisha, which had been massively affected by an onslaught of dust. These dust particles originated from the extensive transportation of coal carried out via a fleet of trucks, trespassing the area 24x7. Their route crisscrossed the place aggressively, beginning from the mines near Tomka to Kalinga Nagar in Jajpur, along with several routes leading outside Odisha.

These dumpers supplied coal to different steel plants inside and outside the state, like Nilachal Ispat Nigam, Tata Steel Ltd, and Jindal Industries near Duburi; and beyond. Further, this coal freight was conveyed through roadways since no railways were available nearby. However, irrespective of why these coal-laden trucks plied, they became a nightmare for the fellow road commuters and residents on the roadside.

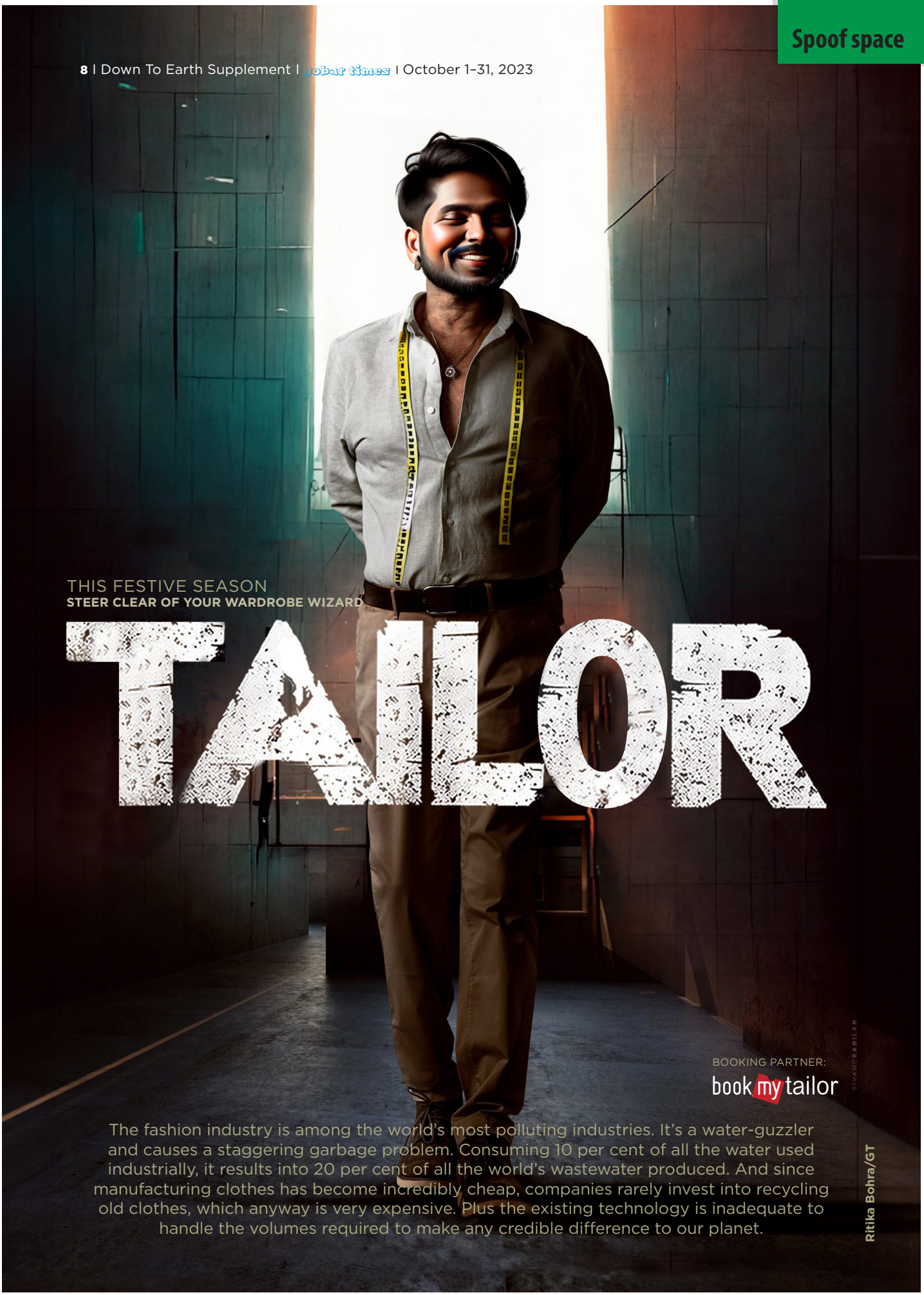
Many irate locals complained about the hundreds of heavy vehicles badly damaging their roads, littering them with potholes and craters as they mounted coal on railroad sidings. As a result, rural highways were rendered unfit even for a humble bicycle ride. The slippery dust made the road surface more accident-prone. Real difficulty occurred during health emergencies. "We're unable to get a patient to the hospital because ten-wheelers carrying coal frequently block the route," grieved the locals.

Trees and houses alongside the entire stretch were layered by a thick coat of black soot. Vegetables and paddy in farms were left unsuitable for consumption, especially when precipitation sweeping the rampant coal powder seeped into the soil. Sprinkling water just made the problem worse, proved by a growing detection of asthma, cancer, and heart and lung ailments among the population. Children suffered the most and many didn't want to go to school anymore!

Without success, the affected communities sought a solution to this menace. "We want the shipping of coal to cease immediately," demanded a localite. Frustrated individuals threatened to protest if the government didn't act to alleviate their pain. The directives issued by the coal ministry in compliance with National Green Tribunal in 2020, stated that no coal shall be transported between 9–10am. However, this was blatantly ignored. As people endured unimaginable misery, a quick inspection by the Odisha State Pollution Control Board was indispensable.

Now, the government monitors and checks the pollution triggered by any such flying dust which was severely hampering the place.

The author is a PhD scholar at the Centre for Studies in Economics and Planning, School of Social Sciences, Central University of Gujarat, Gandhinagar.



The fashion industry is among the world's most polluting industries. It's a water-guzzler and causes a staggering garbage problem. Consuming 10 per cent of all the water used industrially, it results into 20 per cent of all the world's wastewater produced. And since manufacturing clothes has become incredibly cheap, companies rarely invest into recycling old clothes, which anyway is very expensive. Plus the existing technology is inadequate to handle the volumes required to make any credible difference to our planet.

Ritika Bohra/GT