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THE END OF ICE

Exploring a Himalayan glacier.

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A camp on the Chhota Shigri Glacier, in India, where a group of scientists is trying to assess how rapidly it is melting. The Chinese side of the mountain range has been studied thoroughly, but, according to one scientist, “the other side of the Himalayas is a black hole.” Photograph by Simon Norfolk / Institute for The New Yorker

The journey to the Chhota Shigri Glacier, in the Himalayan peaks of northern India, begins thousands of feet below, in New Delhi—a city of twenty-five million people, where smoke from diesel trucks and cow-dung fires dims the sky and where the temperature on a hot summer day can reach a hundred and fifteen degrees. The route passes through a churning sprawl of low-land cities, home to some fifty million people, until the Himalayas come into view: a steep wall rising above the plains, the product of a tectonic collision that began millions of years ago and is still under way. From there, the road snakes upward, past cows and trucks and three-wheeled taxis and every other kind of moving evidence of India's economic transformation. If you turn around, you can see a great layer of smog, lying over northern India like a dirty shroud. In the mountains, the number of cars drops sharply—limited by government regulation, for fear of what the smog is doing to the ice. The road mostly lacks shoulders; on turns, you look into ravines a thousand feet deep. After the town of Manali, the air cools, and the road cuts through forests of spruce and cedar and fir.

A few months ago, I followed that route with an international group of scientists who were travelling to Chhota Shigri to assess how rapidly it is melting. Six of us were pressed together in a van packed with scientific instruments, cold-weather gear, and enough provisions to last several days. My guides were two Indian scientists, Farooq Azam and Shyam Ranjan. Azam, a thirty-three-year-old former bodybuilding champion, has made more than twenty trips to Chhota Shigri. This time, he would be carrying out measurements for the National Institute of Hydrology, in Roorkee. Ranjan, a large, soft-spoken man who grew up in a village on the plains of North India, had never been on a Himalayan glacier. He was hoping to extract an ice core—a sample from deep inside the glacier, which would provide a detailed picture of the area's past climate. It would be the first such sample to be taken from the Indian Himalayas.

There are a hundred and ninety-eight thousand glaciers in the world, and, while many of them have been studied extensively, the nine thousand in India remain mostly unexamined. On the Chinese side of the Himalayas, researchers have performed thorough surveys, but, according to one American scientist, "the other side of the Himalayas is a black hole." The reasons are largely financial: India is a relatively poor country, and there are scant funds available for research. "To adequately study the Himalayan glaciers, we need thirty to forty times more money than we actually receive," A. L. Ramanathan, a glaciologist at Jawaharlal Nehru University, who oversaw our expedition, told me.

Scientists from other countries have moved in to fill the void. Markus Engelhardt, a German, joined us in Manali, and a second vehicle carried a group of Norwegian glaciologists who were heading to a lake near Chhota Shigri to take samples of sediment dating back as far as twelve thousand years. For the Norwegians, the expedition amounted to a tutorial: they were hoping to teach the Indian scientists how to do similar experiments. "There's a thirty-year lag in India," Jostein Bakke, one of the Norwegians, said. "Without a firm understanding of the long-term dynamics of the climate, making predictions about it is like playing the lottery."

In India, the lack of precise knowledge has caused confusion. Two years ago, an article in *Current Science*, an Indian publication, concluded that "most of the Himalayan glaciers are retreating." Soon afterward, the Indian Space Research Organization found nearly the opposite, that eighty-seven per cent of them were stable. Some scientists expressed doubts about both studies, saying that data gathered only by satellites are not reliable for making such judgments. "You really can't tell anything unless you see the glacier up close," Azam said. "That's why I come up here."

For the people who live on the Indian subcontinent, the future of the high-mountain climate is of more than academic interest. The three great rivers that flow from the Indian Himalayas—the Ganges, the Indus, and the Brahmaputra—provide water for more than seven hundred million people in India, Pakistan, and Bangladesh, and they power numerous hydroelectric plants. Already, villages in India and Pakistan are experiencing more frequent flooding from the melting ice; scientists are predicting even more.

At thirteen thousand feet, our van arrived at a pass known as Rohtang La—"pile of corpses," so called because of the many people who have frozen to death trying to get through. Winter was coming, and in a few days the pass would close for six months. The Norwegians had wanted to come earlier, but they received permission from the Indian government only at the last minute; for researchers hoping to work on India's glaciers, the bureaucracy can be as big an obstacle as the lack of funding. "We do not want to get trapped on the other side for the winter," Bakke said.

When we reached the top of Rohtang La, the horizon appeared: a line of mountains skidding downward half a mile to the valley floor. Zigzagging through switchbacks, we made our way down. A new landscape emerged; instead of forests and grassy hillsides, there were boulders, barren slopes, and expanses of scree. The only signs of human habitation were fallow, neatly marked farm plots that crept up the valley walls at improbable angles.

Near the valley floor, we veered onto a rocky trail that tracked an icy river called the Chandra. Our van halted and a group of men appeared: Nepali porters, who led us to an outcropping on the river's edge. Chhota Shigri—six miles long and shaped like a branching piece of ginger—is considered one of the Himalayas' most accessible glaciers, but our way across was a rickety gondola, an open cage reminiscent of a shopping cart, which runs on a cable over the Chandra. With one of the porters working a pulley, we climbed in and rode across, one by one, while fifty feet below the river rushed through gigantic boulders.

WATCH

A Melting Glacier

Once we had arrived at the other side, we made our way across a rock-strewn field to get to our base camp, elevation twelve thousand six hundred and thirty-one feet. The sun was setting and whatever warmth was left vanished. In a few minutes, it was dark, and the stars came out, forming a dome of light so bright you could almost read a book.

Annual expeditions to Chhota Shigri began only fourteen years ago, so relatively little is known about its climatic history. Chhota Shigri and the other glaciers of the eastern Himalayas are unusual, in that, unlike the majority of the world's glaciers, which get most of their snow from winter storms, they get much of theirs from the summer monsoons, which tend to insulate them from more rapid melting. (Most of the glaciers of the Karakoram Mountains, in Pakistan, are not receding at all; it's one of the few places in the world where this is the case.)

The data are also limited by the uneven quality of the expeditions. Glaciologists can spend hundreds of thousands of dollars on research trips, but Azam and Ranjan had only a few thousand dollars to buy equipment and to pay porters. Some glacial expeditions extract ice cores using cranes and ferry them home by helicopter. The Indian scientists would transport their cores in dry ice, using a portable cooler, of the kind you might use to chill beer for a picnic, driving them by car back to Ranjan's laboratory, in New Delhi—a sixteen-hour trip. Some of the experiments that they planned to perform on Chhota Shigri seemed comically rudimentary. In one, to measure the volume of meltwater flowing out of the glacier, a graduate assistant would toss a wooden block into the water and time its float downstream.

In the morning, the sun rose over the mountains, but for hours the high-walled valley remained shaded and bitterly cold. Unlike glaciers in other parts of the world—Greenland, say, or the Alps—many of those in the Himalayas lie at the bottom of narrow valleys that get only a few hours of direct sunlight each day. As a result, they are melting more slowly than they would on flatter ground. It was not until 8:20 A.M. that the sun shone on our camp; by midafternoon the valley was in shadow again.

Markus Engelhardt's first task was to check the camp's weather monitor, which had been planted four months earlier, and recorded temperature, solar radiation, and barometric pressure. There was an array of similar instruments installed throughout the camp; one of them, a five-foot-tall aluminum thistle with a crown of flaps, looked like something you might find in a Santa Fe sculpture garden. Engelhardt had two other weather stations on the glacier, and he was eager to download their data, which would allow him to construct a precise record of fluctuations in the local climate. As he watched information scroll across the screen of his laptop, Engelhardt, who had been stoic during our long ascent, could barely contain his enthusiasm. "I want to go back to the office right now and start studying the data," he said.

For the people who live on the Indian subcontinent, the future of the high-mountain climate is of more than academic interest. The three great rivers that flow from the Indian Himalayas provide water for more than seven hundred million people in India, Pakistan, and Bangladesh. Photograph by Simon Norfolk / Institute for The New Yorker

The team set out into the valley, following a stream that was flowing from the glacier. There were nine of us, including three graduate assistants who'd come with Azam and Ranjan. I had imagined a smooth carpet of ice that led to the top of the glacier. Instead, there was a rough track of boulders, a destructive path that marked Chhota Shigri's retreat. Thousands of years ago, as the glacier moved forward, debris from the valley walls was torn loose by the advancing ice and tumbled onto its face, creating a craggy obstacle course.

Azam had not visited since 2013, when he was completing a doctorate at the University of Grenoble, in France. (His thesis topic: the effect of the climate on Chhota Shigri and the surrounding glaciers.) Like many of the glaciologists I encountered, Azam entered the field not because he was drawn to science but because he loved the outdoors. Born in the plains state of Uttar Pradesh, he grew up seeing the Himalayas on television and dreamt of going there. In college, he took a sensible path, studying chemistry, but he was also athletically inclined; he won several bodybuilding titles, including Mr. Jawaharlal Nehru University. After he finished a master's degree in chemistry, his teachers urged him to go into medical research. But, he said, "I was being pulled by some invisible force."

That same year, he had signed up for a mountaineering course offered by the Indian Army, which took place on the Dokriani Glacier, near the Chinese border. During the course, Azam noticed a series of bamboo rods protruding from the snow: ablation stakes, basic instruments of glaciology. "Until then, I didn't realize you could work on a glacier," he told me. Not long afterward, he went to Grenoble, where he spent the next three years studying ice, making field trips to India every summer. "When I am in the mountains, on the glacier, I feel close to myself—I'm far from everybody, there's no technology, and I can think," Azam said. "Only recently has the science become more important to me."

Ranjan, who is thirty-one, spent years examining glaciers as a graduate student in Switzerland, but he had never been to one in India, where the terrain is much more rugged. On the trail, in his heavy clothes—layers of thermal underwear and fleece and a down jacket—he cut a husky figure. As we started off, he worried that he was not fit enough to complete the expedition. “I am not sure that I can do this,” he said. He moved slowly, panting heavily. The porters practically skipped across the rocky ground as they carried several hundred pounds of our equipment, as well as dozens of eggs.

At higher elevations, the valley deepened; the walls rose a thousand feet on either side, in layers of colored sediment, each representing a different mineral and a different epoch. The landscape was desolate, but occasionally there was a surprise: a golden eagle, a butterfly with orange wings. A solitary black crow followed us the length of the glacier.

Rounding a bend in the stream, we arrived at the glacier’s snout, a cave of ice with water rushing from the entrance. Behind it, Chhota Shigri spread upward into the peaks, a vast shoehorn of snow and ice covered with sharp-edged boulders, most of them the size of a car. The glaciers of the Himalayas are scattered with geological debris, which, along with the lack of direct sunlight, slows melting. Yet, since Azam’s last visit, two years earlier, Chhota Shigri’s snout had receded more than sixty feet. At its largest, the glacier sat almost atop the Chandra, slowly filling it with frigid meltwater; now it is barely visible from the banks. “It’s going very fast,” Azam said, standing on a ridge above it. The shrinking snout had left behind enormous hunks of what glaciologists call “dead ice,” which were melting on the glacier’s trail. A single glance belied the reports that India’s glaciers are stable. After this, all the activity would consist of taking small, precise measurements, to find out exactly what was changing and how much.

The opening of Chhota Shigri’s snout was five feet high, large enough for us to enter. Pressing ourselves against the interior walls and shimmying along the narrow banks of the rushing water, we worked our way into a vaulting palace of ice, where ten-foot-long icicles hung from the ceiling like giant fishhooks. Underneath the roar, you could hear the drip of melting ice. In the walls and the ceiling, water and earth streamed behind sheets of clear ice, the sediment tinting the walls orange and pale green. Air bubbled in the water, trapped when the glacier's ice froze around it, more than two hundred and fifty years ago. "It could collapse at any moment," Azam said. "When we come back next year, it will be gone."

The glaciologist Farooq Azam, a thirty-three-year-old former bodybuilding champion, has made more than twenty trips to Chhota Shigri. On this trip, he came to measure three things: the mass of the glacier, its thickness, and the speed with which it was moving downhill. Photograph by Simon Norfolk / Institute for The New Yorker

On one of Azam's early trips to Chhota Shigri, in 2008, he and a French scientist, accompanied by a porter, trekked to the head of the glacier. When they started back, the next day, Azam fell behind the others. Then the sun went down and the temperature dropped. There was no moon, and the way through the boulders disappeared in the darkness. Alone and disoriented, Azam tripped and fell into the glacial stream. On his knees, he crawled alongside the water—his only clear path—wondering if he would survive. Several hours later, another member of the team found him not far from the base camp, shivering and numb, and helped him make his way back. At the camp, the French scientist apologized for leaving him behind. Azam, worried that his legs were frostbitten, dunked them in a barrel of steaming water. "What I learned was nature is always stronger," he said.

For many glaciologists, the scientific work that they perform on glaciers consumes less time and effort than surviving the journey. There is the cold to consider—temperatures in Antarctica reach seventy degrees below zero—along with steep treks through thin mountain air, and gusts of wind powerful enough to sweep researchers from mountains, not to mention rock slides, marauding polar bears, deep crevasses, and lightning strikes. "Logistics is about ninety per cent of your work," said Aaron Putnam, a glaciologist at the University of Maine who has done field work in Bhutan, Mongolia, western China, and the Beagle Islands, at the tip of South America. "The science can seem almost incidental."

Glaciology is a diffuse field, encompassing meteorologists, geologists, and physicists. While some researchers spend most of their time in the lab, looking at satellite imagery and readouts from remote sensors, many collect their data in far more challenging environments. Mike Kaplan, a Columbia

University geologist who studies glacial and polar ice, has fallen head first between boulders in Patagonia and watched a polar bear destroy his camp in northern Canada. Once, on an expedition to Baffin Island, in the Canadian Arctic, Kaplan drifted out to sea when the engine on his Zodiac boat wouldn't start. "I've never been so miserable in my life," Kaplan told me. "You're just so cold and so uncomfortable. But you've got work to do, so you have to do it."

Lonnie Thompson, a sixty-seven-year-old glaciologist at Ohio State University, has completed sixty-one expeditions to glaciers around the world, conducting research in the Himalayas, the Andes, and the mountains of East Africa, among other places. He's fallen into crevasses in the Andes, and endured seventy-mile-per-hour winds atop a twenty-thousand-foot Peruvian peak, where a pair of Italian climbers were blown to their deaths. A few years ago, he began to have heart trouble, and, rather than retire, he got a transplant. "I may be sixty-seven, but my heart is twenty-five," he said. Last summer, Thompson led a team of sixty to the Guliya Glacier, in Tibet, elevation twenty-two thousand feet; seven tons of equipment had to be hauled in on foot. "There I was, it's minus thirty-five in my tent, " Thompson said. "It's not for everybody." But he was able to retrieve samples of ice that was a half million years old. The trip had its pleasures, too. At night, the Tibetan sky was so dark and so clear that Thompson was able to see other galaxies. "I went into geology because I didn't want to sit behind a desk," he said. "I didn't even know what glaciology was. But I'm a tough dude. I can suffer."

Until the last decade or so, glaciology was an obscure field; today it's being flooded with new students. Like many of the recent recruits, Thompson is propelled by the knowledge that the focus of his career is rapidly vanishing. The ice cores that he's collecting make up an archive of the Earth's weather over the past millennia. But the glacial ice is disappearing, and so is the archive itself. "We are trying to document the history of climate," Thompson said. "If it's not done now, it will never be done." Two of the six ice fields he had visited on Mt. Kilimanjaro are gone. By his estimate, the glaciers in New Guinea will disappear in twenty years. "We're on a salvage mission," he said.

Azam had come to Chhota Shigri to measure three things: the mass of the glacier, its thickness, and the speed with which it was moving downhill. Glacial melt is calculated in "mass balance," a measure of how much ice has been gained or lost. According to surveys conducted by Azam and ten other scientists, Chhota Shigri's mass has declined significantly since 2002, losing more than twenty feet across its surface. The glacier has shrunk in fits and starts; its greatest reductions have occurred in years in which the monsoon faltered, depriving the glacier of much of its snowfall. Recently, India's monsoons have become more sporadic, for reasons that many scientists ascribe to the world's changing climate.

Chhota Shigri is considered one of the Himalayas’ most accessible glaciers, but many of its passes are treacherous. One is known as Rohtang La ("pile of corpses"), so called because of the many people who have frozen to death trying to get through. Photograph by Simon Norfolk / Institute for The New Yorker

Azam usually begins his expeditions by extracting a snow core, which indicates how much fresh snow has accumulated since the last measurement. In 2012, he climbed to seventeen thousand feet to extract a snow core. In a video he took of the operation, he and his assistant stood in a driving snowstorm, rotating the aluminum handle of a tool that looks much like a gigantic corkscrew. The tool pulled loose a foot-long cylinder, which Azam carefully weighed on a digital scale. While he completed the measurement, two porters stood by, unfazed, as snow piled up on their jackets and hats. Finally, Azam said, laughing, "So, for today, it's enough." At the completion of each season's snow core, Azam marks the spot using a G.P.S. device and then places a small beacon—a "reco tablet"—on the snow's surface and marks it with blue powder. When he returns, he locates the beacon with an electronic detector and drills down until he finds the blue powder. "This is the most amazing exercise on the whole glacier," he told me. "I feel like a detective."

One afternoon, we clambered onto the glacier, following a steep path that was covered in snow. The air got thinner, and it was harder to keep going. We were walking in the "ablation zone," the part of the glacier where melting exceeds accumulation; it typically comprises the lower third of a glacier. After several minutes, we came to a bamboo stick poking out of the glacier; this was Ablation Stake 12, one in a network of poles planted across the surface. The stake, buried deep in the ice, had been installed years before, with a steam drill. Azam opened his pack and pulled out his G.P.S. device and a tape measure. "At last I can get to work," he said.

Standing at Stake 12, Azam measured how much of the stick was poking above the snow: about thirty inches. Then he used the G.P.S. device to determine the stick's precise location. He was hoping to learn two things. The first was how much snow had been lost since 2013, when he was last on Chhota Shigri. It's a simple calculation: if there's more snow against the stakes than there was in 2013, then the glacier grew; if not, it shrank. "This seems like a normal amount of melt, but I won't know until I get back to the lab," he said.

The second measurement was the glacier's thickness. On a previous visit, Azam's colleagues, using ground-penetrating radar, had charted the base of the glacier, where the ice meets the earth. Now, by measuring the elevation at various points, he could calculate the glacier's thickness. The data from this trip would take Azam months to sort out. But in previous years the patterns were clear. In 2009, the ice near Stake 12 was four hundred and twenty feet thick. In 2013, it had thinned to three hundred and ninety feet.

Ranjan was far behind us now, moving slowly but waving every so often to signal that he was O.K. At Ablation Stake 11, Azam took another measurement, gauging how much the stake had moved down the glacier. When snow accumulates on the surface of a glacier, its weight pushes the ice forward and down. Using the G.P.S. beacon, Azam calculated the location; since 2013, Stake 11 had moved about a hundred feet down the glacier. "All these measurements show us that the glacier is shrinking," he said. Indeed, most of the other omens were not good: the Indian monsoon season in 2015 was among the driest in decades, and Chhota Shigri appears to have received less snow.

The center line of the glacier, known as the medial moraine, was strewn with boulders that had tumbled and drifted down from the peak. Around many of them, the snow had melted away, leaving them perched like giant mushrooms on stems of snow. Stopping at one boulder, marked with red paint, Azam lay the G.P.S. device on top and calculated its location and elevation to find the speed of the glacier's flow.

As we trudged up the glacier, Azam stopped using his instruments and simply looked around, searching for clues to how Chhota Shigri was changing. His vision was uncanny; he spotted a pile of boulders that appeared to be of a different mineral than the ones around them. “You see those? They are not from here,” Azam said. They had originated high up on the glacier and moved all the way down. At one point, we stopped, and Azam gestured to where one of the glacier’s main tributaries jutted off. “It seems to be detaching itself from the main glacier,” he said. “That’s because the glacier is thinning.”

Continuing on, we heard a noise that sounded like a whirlpool. It was coming from a deep gash in the surface, more than a hundred feet long, into which ice was falling and disappearing: a moulin, a hole connected to a river system inside the glacier. The moulin seemed to have no bottom, but we could hear the water rushing perhaps a hundred feet below. “Don’t stand too close,” Azam said. “The ground around it is not stable.” The moulin was not the only hole in the ice; we had ventured into an area of crevasses, many of them hidden by snow. We had to weave back and forth across the surface to avoid them. Azam went back to check on Ranjan, who was stopping frequently to catch his breath. “I will be O.K.,” Ranjan said, staring down at the snow. “I think.”

Various instruments take measurements of the changing weather on the glacier. Photograph by Simon Norfolk / Institute for The New Yorker

The sun was setting behind the peaks as we arrived at the high camp, at nearly sixteen thousand feet, and the horizon glowed deep orange. The porters had set up tents, and were donning headlamps to help prepare the equipment for the next day's ice core. The temperature was dropping fast, into the teens. We ducked inside the main tent and found the rest of the team huddled in the dark around a stove, drinking cups of salty broth. Ranjan arrived just after the sun went down. "I am so happy to have made it!" he said. The camp was just a handful of tents on the glacier's slope, connected by a little stairway carved into the snow. The porters had made a dinner of lentils and chapati, but we were too nauseated from the altitude to eat more than a few bites. That night, we slept in a ragged tent with no tarp, its doors flapping open, directly atop the ice, nine hundred and fifty feet thick.

The sun was remarkably strong when it shone on us; even though we were freezing, our faces were burned dry and pink. A pool of melting ice had formed around a boulder, and a porter crouched and filled his bucket for cooking. At breakfast—tea and more chapati—everyone was frigid but in high spirits. "Did you see the stars last night?" Ranjan asked. "You could see the whole Milky Way."

After breakfast, Ranjan set about collecting the ice core. From the start, nothing seemed to work right. His gear consisted of a large drill, with an engine the size of an outboard motor, and the drill bit, a clear, sharpened tube that could be driven into the ice. The plan was to drill down about forty feet, where a trove of molecular evidence was preserved in what they expected to be century-old ice. Glaciers are uniquely sensitive recorders of changes in climate, and their ice contains indications of past temperature, precipitation, and volcanic activity, as well as the effects of greenhouse gases. "If we can connect what has happened on the glacier to what is happening in the climate, then we should be able to predict what is going to happen," Ranjan said. The glaciers may already be melting, but knowing their precise state will, he hopes, allow him to understand what it will take to save them.

With Ranjan looking on, one of the Nepali porters started the motor and another pushed the drill into the ice. Ranjan exclaimed with delight—and then the engine stalled. The porter started it again, but the drill could go no deeper than a few feet before stalling. A couple of Ranjan's assistants extracted snow samples, each the size of a rice cake, from the drill bit.

One of the difficulties of taking cores is that the drill bit can melt the ice, causing samples of different ages to mix. Several of the scientists I talked to said that an ice core should be taken from a higher elevation, where the colder temperatures protect the ice from the friction of the drill. I wondered if Ranjan had chosen the lower altitude because he was afraid that he wouldn't be able to climb higher. He told me that the problem was the drill.

“I think we need a bigger engine,” he said.

Later in the day, Ranjan tried again, lower on the glacier, where the snow was not as hard. This time, he was able to drill down about twelve feet, to ice that was some twenty-five years old. It wasn’t nearly as much as he’d hoped for; scientists in Antarctica have taken ice cores from more than a mile below the surface. But it was better than nothing. The samples went into the beer cooler. (Miraculously, they made the long drive to New Delhi intact.) “I’ve learned a lot from this,” Ranjan said. “And I’m coming back.”

On the last day of the expedition, two of the graduate assistants decided to hike up another fifteen hundred feet to take samples of the ice there. Azam, standing a thousand yards away, could see that they had wandered into an area riven by crevasses. “You’re going the wrong way!” he shouted, but they couldn’t hear. They made it as far as sixteen thousand seven hundred feet when a faint, high-pitched cry rose up. When the group turned, they saw the head of Teg Bahadur, one of the porters, peeking out over the edge of a crevasse. The team’s gear, including the G.P.S. device, had sailed down into the crevasse and disappeared. One of the graduate students poked the snow around Bahadur and it collapsed, revealing the crevasse’s multicolored walls and its seemingly bottomless depth. Bahadur, perched on a shelf, trembled in silence. “I’ve never been married,” he said, mournfully. Digging their boots into the snow, the rest of the team managed to pull him to safety. But, despite several descents by one of the students, the gear was lost.

"We compromised—he can BASE-jump all he wants, as long as he does it at home."

The day before, I had stood with Azam as he prepared for another ascent. Tethered to a lone porter, he planned to climb to seventeen thousand feet and examine the ablation stakes planted there. In the coming year, Azam and other scientists plan to publish a number of papers based on research performed in the region, in the hope of filling the gap in knowledge. There is still little money in India for this kind of work, but the government seems to be slowly coming to appreciate its importance. In the weeks before the recent climate talks in Paris, some Indian politicians insisted that they should not have to restrict their country's energy consumption to fix a problem that was mostly not of their making. Ahead of the conference, though, India agreed to significant reforms, including greater efforts in the Himalayas, and afterward the Prime Minister, Narendra Modi, announced that "climate justice has won."

I asked Azam what he thought would happen to Chhota Shigri, whether it could survive global warming. "I am not going to save this glacier," he said. "I am just going to find out what is happening."

He turned and looked up at the peak in front of him. "Once I do that, the next step will be to decide what has to be done. But these things don't depend on science. They depend on politics." ♦

An earlier version of this article incorrectly identified when the tectonic collision that formed the Himalayas began.

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