

Dying Kids, a Poor Indian Village, Uranium and a Mystery

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July 9, 2014 – On a sun-seared afternoon, Sanjay Gope crawls across a dusty courtyard of the low-slung, mud-walled house he shares with 10 members of his family. Stacks of cow dung dry in the heat and chickens rest in the shade.

His grandfather, Debnandan Gope, watches glumly as the boy struggles, face streaked with sweat, one thin forearm, then another, digging into the dirt, his legs and feet carving a winding trail behind him.

About 10 years old – ages in India's villages are often estimates – Sanjay could move normally as a toddler until seizures began to wring the life from his arms and legs. Now, when no family member can assist him, he's left "to crawl around the ground like a snake," his grandfather said.

That would be dispiriting enough save for the omen it conjures. An older sister, Sunita, experienced a similar collapse. Her limbs grew so deformed that she couldn't feed or bathe herself before she died two years ago at 13.

Across the path that runs by Sanjay's house, Rakesh Gope, a member of Sanjay's tribe although no direct relation, sits on a dirt floor under the rusting corrugated roof of an open-air



Once ringed by lush tribal forests, the village of Jadugora is today a troubling portrait of modern India, its outskirts a postcard of pastel-painted mud houses scattered amid tidy rice fields, its center the hub of India's uranium mining industry that is fueling an unprecedented nuclear power boom. For years, desperately poor people living in scattered villages in the shadow of these mines have been tormented by a mystery: What's causing the wasting diseases that are deforming and killing so many of their children?

room where his grandfather is sleeping. A slight boy with light brown eyes, he attempts to wave but his hands only flap in a spastic flurry. He's another 10-year-old unable to walk on his own.

No one knows exactly how many children like this live here and in nearby villages – only that they are all too easy to find.

Troubling Portrait

Sanjay and Rakesh live near Jadugora, a town of 19,500 people about 850 road miles (1,370 kilometers) from New Delhi in east India's Jharkhand state. Once ringed by lush tribal



Ten-year-old Sanjay Gope of Bango village near Jadugora moved normally as a toddler until seizures began to wring the life from his arms and legs. When there is no family member around to assist him in walking, he is "forced to crawl around the ground like a snake," according to his grandfather.

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It's here that state-run Uranium Corp. of India Ltd. is licensed by the Indian government to gouge hundreds of thousands of tons of uranium ore out of the ground each year, while just over a hill, an easy walk from the village, 193 acres of ponds holding mildly radioactive waste stand largely unguarded save for no-trespassing signs.

Mystery Disease

For years, these desperately poor people living in scattered villages in the shadow of these mines have been tormented by a mystery: What's causing the wasting diseases that are deforming and killing so many of their children?

Sanjay's 70-year-old grandfather, a bare-chested, barefoot man rendered lean by hard work and a sparse diet, offers an observation shared by many here – that before the mines

came, children did not crawl around in the dirt and die. He might be dismissed as an illiterate, grieving relative of a crippled boy and a dead girl except that outsiders, including the Jharkhand High Court and environmental activist groups, suggest he may be right.

In February, the High Court in the state capital of Ranchi filed a petition that pointed to the mines operated by Uranium Corp. since 1967. Shocked by photographs of the area's sick and deformed children in the Indian press, the court ordered the company and relevant government agencies to explain what measures they were taking to protect the health of those living in villages around the mines.

'Health Problems'

"The health problems related to uranium mining are affecting the indigenous people disproportionately in and around the uranium mining operational area," with as many as 50,000 people "at risk," the court wrote.

Children living near the mines, the court added, "are born with swollen heads, blood disorders and skeletal distortions. Cancer as a cause of death is more common in villages surrounding uranium operations."

The High Court isn't alone in its concerns. In 2007, an Indian physicians group published survey results showing villagers near the mines reported levels of congenital deformities and deaths from such deformities far higher than those 20 miles away.

In 2008, the Jharkhandi Organization Against Radiation, a local activist group, collected water samples from 10 Jadugora- area locations, including wells and streams. Seven were shown to have

unsafe levels of heavy metals – including lead, a byproduct of uranium mining, and mercury.

Affidavits Filed

Bloomberg News reporters in June took water samples at two sites. Results from an independent testing laboratory found mercury and lead levels within acceptable government guidelines. The lab did find a potentially problematic reading for uranium in water that could make its way into local wells.

In response to the High Court's petition, Uranium Corp. and government agencies in March and April filed 337 pages of affidavits and exhibits, obtained by Bloomberg News and never before made public, amounting to a categorical denial by the company that it bears responsibility for Jadugora-area health issues. A similar query in 2004, one company document said, was dismissed for lack of evidence before India's Supreme Court.

The affidavits also included a document from a provincial regulatory agency detailing Uranium Corp.-backed studies conducted from 2010 to 2012 in 16 villages involving 4,557 examinations of children and adults that produced no cases of congenital malformation. That included three villages near Jadugora where Bloomberg News reporters easily found children and adults with deformities.

'Conventional Health Problems'

"The villagers suffer from conventional health problems, which could be seen in any village with similar socio-economic condition," wrote Mahendra Mahto, secretary of the Jharkhand State Pollution Control Board, pointing to the 2010-2012 survey.

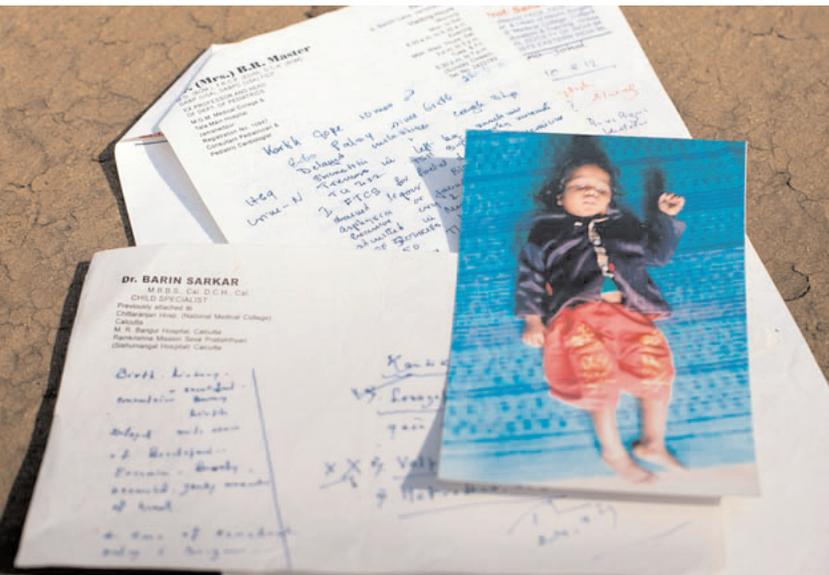


Women wash clothes and bathe near Bango village in Jharkhand state. The nearby River Gara, which receives some water from the tailing ponds, is used by many locals daily to bathe and fish.

The survey wasn't signed by Mahto but by Dr. U.K. Majhee – identified as Uranium Corp.'s chief medical officer at its Jadugora hospital. He declined to be interviewed when approached at his office. Mahto said in a phone interview that he couldn't respond now to questions about the survey because he didn't have the study in front of him. "Unless I see the document, how can I say what I have said and what I have not?" he said.

Diwakar Acharya, Uranium Corp.'s chairman, in a June 25 e-mail to Bloomberg News, repeated the company's position that its "operations in the area do not have any adverse health effects to the surroundings."

Resolving the mystery seems all the more critical considering that some of the water from three Uranium Corp. ponds holding uranium waste known as tailings -- treated, the company says, to remove contaminants -- empties into the River Gara, which flows past Jadugora and several other villages and is used daily by locals to fish and bathe.



Kartik Gope's medical records documenting his deformities. No government agency in the locals' memory has conducted the kind of comprehensive study that could get to the bottom of what's sickening and killing the children there.

Tailings Ponds

Just as worrisome are the ponds themselves. They cover an area about the size of 146 football fields and “are exposed and accessible,” said Nitish Priyadarshi, formerly an assistant professor of geology at Ranchi University and member of the Geological Society of India who researches and writes about Jharkhand mining issues. “There’s a lack of awareness among the people in the area. They should probably be moved but it may be too late.”

Acharya, the Uranium Corp. chairman, in the e-mail response said the company has posted proper warning signs and that it can’t be blamed for trespassers. “However, it is to clarify that radiation level in referred area is quite low and short duration exposure has no adverse effect on health,” he wrote.

Others are convinced something is amiss. “Deformities are prevalent in the age group born after mining started there,” said M.V. Ramana, a physicist and India nuclear-energy specialist at Princeton University’s Nuclear Futures Laboratory,

in Princeton, New Jersey, who has written extensively about Jadugora. “It’s not so among older people. That something is affecting them is very clear. It may be radiation, it may be some other heavy metals that contaminate the water. We don’t know for sure.”

Community Meeting

That’s the issue for residents. Neither the company nor any government agency in their memory has conducted the kind of comprehensive study that could get to the bottom of what’s sickening and killing their kids. That would include counting the number of sick and dead and systematically testing for root causes -- assembling genetic and medical histories, collating the results of any previous doctors’ exams and testing for environmental factors like water and soil contamination at their homes and villages.

Debnandan Gope recalled a 2009 community meeting at which villagers broached the health issue with Uranium Corp. officials in attendance. “They gave us one samosa,” bread and vegetables but no answers, he said. “Nothing has happened since. There’s been no help.”

Denials

“Comprehensive and long-term studies” should be carried out, said Ramana, and “at the very least there should be regular monitoring of air and water quality, testing of food and keeping accurate records of diet.”

That this has never been done is unsurprising, he said. “The predominant reaction on the part of the nuclear establishment in India

of ill-health associated with nuclear facilities has been denial or variants thereof.”

Officials at India’s Department of Atomic Energy and the federal Ministry of Health and Family Welfare didn’t respond to e-mails and phone calls seeking comment for this story.

Jadugora’s mines speak to India’s scaled up nuclear power ambitions, even as Japan’s March 2011 Fukushima nuclear meltdown has spurred international debate about the safety of atomic energy programs. Indian officials, facing nationwide power shortages, have said they want to increase nuclear power generation capacity to 62,000 megawatts by 2032. Nuclear energy now provides 1.9 percent of India’s electricity generation capacity.

Fuel Pellets

Uranium Corp., in charge of supplying fuel for that plan, employs about 5,000 people in the mining and processing of uranium, which is the core element in making fuel pellets that fire the reactors in nuclear power plants. Besides its Jadugora- area mines, Uranium Corp. operates the Turamdih mines about 12 miles away, near the city of Jamshedpur, with a metropolitan area population of more than a million people. There have been no comparable reports of illnesses there as in Jadugora and a handful of surrounding villages.

The Turamdih operation began in 2003. New uranium mines are planned in Jharkhand and three other states, according to the Uranium Corp. website.

The Jadugora mines are blocked off by concrete walls and barbed wire. Their gates open for 10-wheel dump trucks, loaded with chunks of



Ten-wheel dump trucks, loaded with chunks of uranium ore, rumble down the road in Jadugora to a central plant. After processing the ore into a powdery compound known as yellowcake, Uranium Corp. transports it to southern India to be made into pellets for atomic power stations.

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Leftover Tailings

The leftover tailings, in the form of a sand-textured slurry, contain low-levels of long-lasting radiation at about 85 percent of the radioactivity from the original ore. Uranium Corp. said its tailings are treated with lime to remove heavy metals. A 2011 government report sent to the High Court showed that the company's Jadugora processing plant generates an estimated 2,090 tons of mining waste daily, of which 1,000 tons is pumped back underground, leaving about 1,090 tons of treated slurry to be routed every day into its tailing ponds.

Solids settle to the bottom of the ponds, lined with non- permeable material. The



Four-year-old Kartik Gope has weakness in his limbs and can't keep his head from flopping to his shoulders. His mother feeds him in their home in Bango. Local doctors have examined many of these stricken children in local clinics and the results are a mis-mash of conflicting diagnoses, even for siblings with the same symptoms.

remaining water is routed to a treatment plant before being released, some of it making its way into the Gara.

The health danger in all uranium mining, says the U.S. Environmental Protection Agency, is that tailings include radioactive elements like radium that decay into a gas called radon linked to lung cancers.

Primary Threat

The primary health threat to humans occurs when radon gas is inhaled or when radioactive elements from tailings leach into public water supplies. Gamma radiation thrown off by elements in tailings can also “pose a health hazard to people in the vicinity” including genetic mutations that can be “passed on to offspring,” according to the EPA. Uranium Corp. says that its treatment and disposal standards meet all international safety requirements.

Reporters visiting the dump site in April saw workmen at the tailing ponds repairing one of the metal pipes that carry the mildly radioactive slurry, part of a series of winding metal tubes that stand off the ground on small stilts. A guard in a khaki uniform wandered the area carrying a

three-foot wooden stick and absentmindedly waving it in the air.

In the distance, two women in saris strolled up the path leading to the ponds, each carrying a cane basket. No fences block access at the entryway to the ponds area. Locals say they pass in and out of the dump site regularly and it still houses a tribal place of worship.

Water from the pond site flows past a block-lettered sign with the words “PROHIBITED AREA” hand painted in red. It passes by a field used by village children to play soccer, and on to the Gara. Villagers squat at the river’s edge to wash clothes, bathe and fish for food.

Poor Community

Jharkhand is a poor place, even by India’s standards. Average annual per capita income is equivalent to about \$720 despite the existence of substantial coal and uranium reserves. Debnandan Gope, for example, makes 83 cents a day as a field hand – when he can get work. Illiteracy is common.

People cook on fires fueled by dried cow dung. Women walk the roadsides balancing gleaming metal water jugs on their heads as they go to and from public wells. Village men still plow the land with cattle. Some gather in houses on legs not much more substantial than baseball bats, a result of the meager rice- paste diets common here. Life expectancy is among the lowest in all of India – 58 years compared with 63.5 for the nation as a whole, according to a 2011 United Nations report.

Many scrounge and scavenge to get by – even around uranium dumps. Trespassing signs, assuming they can even be read, don’t mean much.

Six Toes

On the sandy banks of the Gara, Chotu Ho pulled plants from its dark, slow moving waters and paused to pluck tiny shrimp and snails off the foliage. A resident of a nearby village, he wore a white sleeveless vest and a lungi, a traditional sarong that was hiked up to his thighs. Both of his feet had six toes.

"I know there's uranium in the water and I may fall ill," said Ho, holding up his catch for inspection under a bright sun. "You can't eat this, but we have to. We're used to it now."

Debnandan Gope, who once manned the slurry pits as a Uranium Corp. contract worker, still goes into the tailing ponds area, as does his wife, to collect firewood. He recalled his work back then. The sludge came by pipe and it was his job to push the stuff into a pit, about 12 feet wide (3.7 meters) by 12 feet long, with a spade. The next day, he would dig a new pit to fill. Sometimes, when he fell behind, Gope just shoveled it in with his hands.

Slurry Pits

The waste was black and smelled burnt, "like fireworks." At the end of the day his arms would be caked with a substance that, when dry, glittered. The extent of safety measures, Gope said, was that a supervisor advised him to wash his hands before eating.

He left when his contract expired and now tends small farm plots for his family and others. While he knows that using wood from a site used to store radioactive waste isn't a good idea, Gope said, "Without the firewood how would we cook?"

As a precaution, Bloomberg News reporters visiting the site and other areas carried a



Kaliburi Gope sits outside her home in Bango village. "Deformities are prevalent in the age group born after mining started there," said M.V. Ramana, a Princeton University physicist and India nuclear-energy specialist.

dosimeter, a hand held device used to measure radiation in the air. It produced a reading in Bango village, about two miles from the tailings ponds and where Sanjay Gope lives, that converts to 7 millisieverts a year. Normal background radiation is about 3.1 millisieverts a year, according to the U.S. Nuclear Regulatory Commission.

Safe Levels

Still, the Bango reading is below levels for which there is evidence of human health effects, according to the United Nations Scientific Committee on the Effects of Atomic Radiation. The impact of long-term exposure to lower doses of radiation isn't well understood.

Uranium Corp. included in its court filings a 2002 study by one of its consultants that showed village area radiation levels at 2.81 millisieverts annually. The company said in its e-mailed statement to Bloomberg that measuring radiation "is a specific skill acquired through

qualification and domain knowledge of the subject” and that a measurement taken with “unknown assumptions is not acceptable.”

The mines, and fears about possible health effects, have sparked only limited protests in the villages. The environmental impact of extractive industries like uranium and coal, twinned with economic straits of locals, have become a rallying cry for Maoist guerrillas in the country’s “Red Corridor,” a stretch of mining states that include Jharkhand. Maoist attacks targeting police and public officials haven’t stopped the mining.

Sick Children

It’s the sick and dying children that have drawn the most concern. During 2007, the Indian Doctors for Peace and Development, an affiliate of Nobel-winning, Massachusetts-based International Physicians for the Prevention of Nuclear War, canvassed 2,118 households in five villages within 1.5 miles of the mines.

The surveys found mothers there reporting congenital deformities more than 80 percent higher than the rates of mothers in villages just 20 miles from the mines. The rate of child deaths reported from such abnormalities was more than five times as high. Uranium Corp. has dismissed the findings as the biased work of “antinuclear groups.”

Still, affidavits filed with the High Court by the government and the company produced a 1998 survey with participation from Uranium Corp. that found unusual “congenital limb anomalies” among area residents – though the report said they weren’t radiation related.

Water Samples

The 2008 water samples collected by the

Jharkhandi Organization Against Radiation were analyzed by the Centre for Science and Environment, a New Delhi-based environmental research and advocacy group that maintains its own laboratory. A notable finding was in a sample from a village tap meant to supply safe drinking water that contained mercury levels 200 percent above allowable Indian government limits at the time, according to laboratory results.

Lead found in a well used for drinking water was more than 600 percent higher than government limits. Uranium Corp.’s chairman said in his e-mail that he wasn’t aware of those tests. Mercury isn’t a byproduct of uranium mining and the Centre didn’t investigate the reason for its presence. The U.S. Geological Survey says mercury is a ubiquitous element found in small quantities in “all rocks, sediments, water, and soils” and in higher concentrations in certain “local mineral occurrences.”

Ingesting lead can cause muscle weakness and brain damage in children, according to the U.S. Agency for Toxic Substances and Disease Registry. Mercury’s harmful effects to human fetuses may include brain damage, mental retardation, lack of coordination and seizures.

Uranium Levels

The water samples gathered at two sites last month by Bloomberg News – at a stream taking runoff from the tailing pond area and a hand-pumped well in Bango village – came back with significantly lower results than the Centre for Science’s lab found. Mercury and lead levels were below levels the government deems a threat to human health.

The results did show uranium levels from the

stream at amounts exceeding World Health Organization drinking water guidelines by 33 percent. Locals don't typically drink from the stream though the water may feed into local wells from which people do drink, according to Souparno Banerjee, the centre's outreach director.

The Bloomberg samples were taken to New Delhi in sealed plastic bottles and analyzed by the Shriram Institute for Industrial Research. The institute is among those approved by the government's Delhi Pollution Control Committee for carrying out such tests.

The High Court petition and the studies by the Indian Doctors group aren't the first time Uranium Corp. has been in the news over radiation pollution. A company statement acknowledged pipelines carrying uranium waste from the Jadugora mines burst in December 2006, spilling radioactive slurry into surrounding fields. The company said the accident was "attended in the shortest possible time."

'Radioactive Waste'

When flash floods hit in June 2008, sending waste cascading into fields, the Hindustan Times quoted a Uranium Corp. spokesman as saying, "the radioactive waste flowing through the village is harmless, as incessant rains have diluted the intensity of radioactivity."

The sick children aren't hard to find. In a mud house painted green, about 100 steps from Sanjay Gope's front door, a four-year-old with telltale weakness in his limbs can't keep his head from flopping to his shoulders. And then there are the deformities.

Next door to Rakesh Gope's house, 14-year-old Parbati Gope, who has a misshapen chest



Pipes like these carry treated, mildly radioactive slurry from Uranium Corp. of India's mining operations to a system of uranium tailing ponds covering 193 acres. The company says it posts proper signs warning locals not to trespass.

and back, stands in a narrow alley as her mother Kuni describes their experience with local health care. "The doctor said 'I don't know what this is, I can't do anything, take her to the hospital.'" Her mother lifted the back of her green tunic to show what looked like a baseball-sized growth underneath her skin.

Forehead Indentation

A few minutes' walk down the road and, behind a courtyard door fashioned by metal cut from mustard-oil tins, Kaliburi Gope, about 20 years old, had similar bulges and an indentation on her forehead. No one can say exactly how many of these cases exist.

Local doctors have examined many of these stricken children in local clinics and the results are a mish-mash of conflicting diagnoses, even for siblings with the same symptoms. Some doctors have blamed polio though the disease appears to have been eradicated, with India's last case reported in 2011.

Others point to cerebral palsy, which is a kind of catch-all diagnosis for a debilitating injury to the brain that could have numerous underlying causes – including mercury or lead poisoning.

Witch Doctor

Sanjay Gope's case shows how desperate parents are for answers. They called a witch doctor to their home. The man sprinkled red powder on the ground and slit the throats of two of the family's chickens, letting the blood splash in the dirt before taking the carcasses for himself. He blamed evil spirits.

Sanjay was then taken to the clinic of Dr. Barin Sarkar, a child specialist in Jamshedpur. Dr. Sarkar's small office is in the ground floor of a house that at night goes dark except for the light of the waiting room. There, mothers from the countryside hug their children and wait their turn, hoping to be seen before the office closes at 9:30 p.m.

Dr. Sarkar said in an interview he diagnosed Sanjay as having muscular dystrophy. The disease is genetic, inherited through relatives, though no one in Sanjay's family can recall anyone else suffering from it.

Partially Paralyzed

A village homeopathic doctor, Sudhir Nandi, said in an interview that Sanjay's sister, Sunita, was partially paralyzed by something "polio-like." He couldn't say what exactly killed her. Another local doctor, Hem Chandra Gope, said he examined a 13-year-old girl with similar symptoms and concluded she was taken down by polio. Dr. Gope said he'd seen "a few dozen" cases like hers in the area, and then changed the number to "maybe about 15."

A medical certificate for Rakesh Gope, prepared at one of the medical "camps" held regularly to evaluate locals en masse, classified his illness as cerebral palsy. A similar certificate for Kaliburi Gope said she had dorsolumbar kyphoscoliosis, a deformity of the spine.

In Potka, about 12 miles from Jadugora and the administrative seat of a block of more than 200 villages that include Sanjay's, Dr. Rani Kumari Beck splits her time seeing patients between two government health clinics. When reporters caught up with her during a Sunday shift in May, she said she was well aware of Jadugora's health woes. "Our observation – and it is just an observation – is as you move away from the mines the incidence of these diseases decreases," she said.

Rural Clinics

Dr. Beck's view is that the rural health facility isn't equipped to diagnose much less treat such cases. The physical condition of the clinic seemed to confirm that. A few patients lay on thin mattresses in dark rooms. Abandoned freezers sat rusting outside in front of a dilapidated former doctors' office occupied by a caretaker, its shutters crooked and chunks of concrete missing from its exterior wall.

Dr. Beck refers children with serious health issues to hospitals in bigger towns. Many families, poor and illiterate, can't afford that and are left to try to figure things out on their own, visiting a jumble of village holy men and local doctors.

Those who do have cash travel to doctors in Jamshedpur, the nearest actual city, where they collect diagnosis notes written in English, a language most of them can't read. They take the

sheets of doctors' stationery back home, stuff the paperwork into plastic bags or folders – and are nowhere closer to getting an answer than when they began.

Bags of Paperwork

Amitabh Kaushal sits in a modest air-conditioned office behind a large wooden desk, scrolling through his iPad. As deputy commissioner for East Singhbhum District, he is the area's ranking bureaucrat. He said he's heard that studies have been done in Jadugora – he's just never seen them.

"This is what I'm told, but I've yet to look at those reports," said Kaushal. He asked for the details of families Bloomberg reporters had interviewed and noted down their names. "In light of this thing, the information you have just provided, I think fresh studies again are called for – as to correlate whatever data was there earlier and whatever is there today," Kaushal said. "Such diseases in different families without a common linking factor do require a detailed, serious investigation."

Kaushal said that he would have more information in seven days but e-mails and phone calls to him in the weeks following were unreturned.

Company Doctor

A visit to Dr. A.K. Pal, another chief medical officer at Uranium Corp.'s Jadugora hospital, produced a similar reaction of puzzlement.

After hearing a description of Sanjay's and others' physical conditions, Dr. Pal, who has worked in the area since 1989, said, "I have been to a lot of villages and I will go to more villages for medical camps. I have not seen this."



Leda Karmokar sits next to the grave of his daughter, Lali, in the Bango village. Lali never had a chance, said Karmokar, a man whose weathered visage and missing teeth make plain his poverty. "She couldn't walk. She couldn't use her hands. She just crawled around."

He was speaking in a small surgery recovery room during his rounds, reading glasses perched on the end of his nose, a mobile phone holstered to his waist.

Not a single case?

"No," he said.

Sanjay Gope's family lives just four miles away. And down the road from them, Leda Karmokar, a field laborer lying in a dark, sweltering room without electricity, rises to show visitors to the jumble of rocks in the field that marks the grave of his 11-year-old-daughter, Lali, who died about two years ago. He stands at the grave site beneath an implacable sun on a scorching, windless day, a nearby palm tree pinned against the sky like a still life. Women across the road wash clothes in a pond. Cows graze and twitch at flies in the unrelenting heat.

Lali never had a chance, said Karmokar, a man whose weathered visage and missing teeth make plain his poverty. "She couldn't walk. She couldn't use her hands. She just crawled around."

India's Uranium Boss Says Deformed Children May Be 'Imported'

By Rakteem Katakey
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Bloomberg News

July 24, 2014 – Confronted with reports villages near Uranium Corp. of India Ltd.'s mines have unusually high numbers of physically deformed people, Chairman Diwakar Acharya said: "I wouldn't be surprised if a lot of those guys are imported from elsewhere, ok?"

A Bloomberg News report on July 9 highlighted the struggles of the locals with disease and early deaths – and the suspicion they shared with some environmental activists that the health conditions are linked to mining waste.

Acharya dismissed as biased any findings of a correlation between the mines and deformities in nearby villages. Activists and doctors come with an agenda to Jadugora, a town of about 19,500 people in eastern Jharkhand state that's home to the company's main operations, he said in a July 14 interview.

"See, what happens is, you say you are a specialist and you'll come and treat," Acharya said at Uranium Corp.'s headquarters. "But all you do is, you are convinced UCIL is evil and you have come here only with the sole motive of finding reasons which would validate your preconceived notions."



The Uranium Corp. of India Ltd. facility stands in Jadugora
Photographer: Manjunath Kiran/AFP/Getty Images

Uranium Corp. sends its security officers to monitor attempts by outsiders to examine villagers, Acharya said, explaining it was a necessary step for collecting information about alleged health problems. He was skeptical when told Bloomberg reporters had met a dozen families stricken by deformities, and in particular reviewed the medical records of four children and interviewed their doctors.

"Maybe," Acharya said. "Your word, my word."

'Healthier Environment'

Company-backed surveys show that compared with outlying areas, "there's no change in disease pattern around Jadugora," said Acharya, 57, who started at the company as a

mine manager in 1988. "If at all, it is better because of the healthier environment here."

Photographs in an Indian newspaper of deformed children in the villages around Jadugora led the Jharkhand High Court in February to demand an explanation from Uranium Corp. and government agencies. The High Court wrote in its order "the health problems related to uranium mining are affecting the indigenous people disproportionately in and around the uranium mining operational area," with as many as 50,000 people at risk. Children living near the mines are "born with swollen heads, blood disorders and skeletal distortions," it said.

Ananda Sen, the lawyer appointed by the court to review the case, said he's considering asking a judicial panel led by the state's chief justice to order an independent inquiry. First, he needs to "study some more on the health aspect and all these things," he said in a July 14 interview.

False Impression

Regarding his theory that disabled people had been brought into the local area to create a false impression, Acharya provided no explanation for why impoverished villagers, many of whom subsist mainly on rice gruel and show signs of malnutrition, would help carry out such a deception.

Uranium Corp.'s tailing ponds, dumpsites containing mildly radioactive waste pumped out of the mines, stretch across 193 acres (78 hectares). The company says the waste is treated to remove contaminants. Some water from the ponds empties into the River Gara, which flows past surrounding villages and is used daily by locals to fish and bathe.

Amitabh Kaushal, who oversees health and family welfare services of the area holding the

uranium mines as deputy commissioner for East Singhbhum district, said in May he thought an investigation was warranted. He has since declined to discuss the matter, refusing to be interviewed when approached at his office on July 14.

Opposite View

A 2007 study carried out by a group called Indian Doctors for Peace and Development examined 4,022 households and reached a conclusion that was the opposite of Uranium Corp's: the closer a family lived to the mines, the more likely it was to report having someone suffer from congenital malformation. The doctors' group is an affiliate of the Nobel Prize-winning, Massachusetts-based International Physicians for the Prevention of Nuclear War.

Neither that study nor any other has established evidence of radiation poisoning in the area. Still, a 2008 analysis of the area's water highlighted another possibility: The presence of heavy metals.

Samples analyzed then by the Centre for Science and Environment, a New Delhi-based environmental research and advocacy group that maintains its own laboratory, found drinking water with mercury levels 200 percent above Indian government limits at the time. Well water in another spot contained lead that was more than 600 percent over the limit, the Centre found. Lead is a byproduct of uranium mining, mercury is not.

Toxic Water

Water collected by a Bloomberg reporter in June from a stream leading out of the tailing pond area contained uranium levels 33 percent

higher than World Health Organization drinking water guidelines. While local people don't consume water directly from the creek, the flow may make its way into local wells.

Pinaki Roy, a spokesman for Uranium Corp., said he didn't know of any reports about heavy metals in the area. He declined to elaborate.

Health or environmental concerns aside, India plans to increase nuclear power generation capacity 13-fold to 62,000 megawatts by 2032. Nuclear energy, which is fueled by uranium, accounted for 3.5 percent of the nation's electricity generation last year, Jitendra Singh, an official in India's prime minister's office, said in a written reply to questions in parliament on July 16.

Local Fuel

Of the nation's 20 nuclear reactors currently in commercial operation half are eligible to use imported uranium under International Atomic Energy Agency rules, Singh said. The 10 others use locally produced fuel, he said.

"Energy security based on clean and reliable sources is essential for India's future," Prime Minister Narendra Modi said on Twitter after meeting government nuclear scientists in Mumbai on July 21. "Nuclear energy has a key role in India's energy strategy."

On the morning of July 13, in the village of Tilitand outside Jadugora, a group of doctors from Kolkata had set up a medical clinic at a schoolhouse. Villagers queued up at rickety desks and scuffed wooden tables on the school building's porch.

Many weren't sure of their ages; they negotiated guesses with the volunteers taking their information. One 35-year-old woman blamed the

deaths of two family members on a witch, according to her survey form. Of 108 patients, 35 reported having skin diseases, organizers said.

Wind and Dust

The village sits adjacent to one of the tailing ponds. On windy days, dust from the pond area settles on people and on open pails of drinking water, said Govind Hansda, a farmer who lives next to the school. Dust is unrelated to the reported health problems, Uranium Corp.'s Roy said.

"The thing is that in this area their sanitary habits are suspect," he said.

A white truck marked "ON SECURITY DUTY GOVT. OF INDIA" and bearing the initials for state-owned Uranium Corp., UCIL, pulled up within minutes of the clinic's opening. A security officer who introduced himself as Khetra Mohan Majhi emerged, opened a green notebook and asked the doctors for their names.

"We just want to know who is here," he said.

Later, a man with a green camouflage ball cap pulled low over his forehead positioned himself next to where villagers were giving their names to a volunteer. The man cupped a small piece of paper in his hand and, looking over the volunteer's shoulder, took down each detail. He ran away when he saw a reporter pointing a camera in his direction, jogging around the corner and pedaling off on a bicycle.

Secret Guard

Interviewed later, he first said he was a member of the group that helped organize the clinic, Jharkhandi Organization Against Radiation. After being told by a reporter that none of the organizers knew him, he said he was Gurcharan

Munda, 24, a security guard for Uranium Corp. Munda said he was ordered by one of his supervisors to gather the clinic participants' names.

The security presence wasn't meant to deter attendance at the clinic, Acharya said, adding he doesn't condone his employees operating "stealthily."

"Not intimidation – no, no, no – we want to know what is happening around here," he said.

The documentation the company submitted to the Jharkhand High Court focused on community-level studies, not individual cases. In the past five years or so there have been "five or six or seven children" whose cases were featured in media reports, said Roy, the company spokesman.

Ordinary Problems

The company had them checked by doctors, who found they were suffering from a range of ordinary medical problems and malnutrition, he said. As for health problems linked to the

company's operations, Roy said, "there hasn't been a single detected case, per se."

"Supposing tomorrow, somebody turns up and says – X, Y, Z – these four guys have deformities because of radiation –we'll go to them," Acharya said. "We have done, in each such case in the past. We have sent a medical team, a radiation expert – they have gone, found out, measured the radiation level around their individual houses, tried to conclude what is the disease and why. We'll do that again."

In every case, Acharya said, Uranium Corp. has been vindicated.

–Editors: Indranil Ghosh, Ken Wells

India Court Orders Uranium Corp. to Probe Deformities Near Mines

By Rakteem Katakey
Tom Lasseter
Bloomberg News

August 21, 2014 – India's sole uranium mining company is being ordered by a regional court to disclose radiation levels and the presence of any heavy metals in soil and water in a cluster of villages with reports of unusual numbers of deformed and sick children.

The order by the Jharkhand High Court also mandates that Uranium Corp. of India Ltd. explain how it ensures the safety of nearby civilian populations who may be exposed to its 193-acre (78-hectare) radioactive waste dump near the village of Jadugora in eastern India.

The move comes about a month after a Bloomberg News story chronicled the plight of parents living near the Uranium Corp. mines who are seeking answers to what's sickening and killing so many of their kids. The story also reported that local residents routinely wander the unfenced dump sites and fish and bathe in a river that receives water flowing from the dumps, known as tailings ponds. The Bloomberg article was submitted to the judges of the High Court by Ananda Sen, the lawyer appointed by the court to review the case.

Uranium Corp. has denied its mining operations have anything to do with village health issues. In



The Uranium Corp. of India Ltd. facility stands in Jadugora
Photographer: Manjunath Kiran/AFP/Getty Images

2007, a survey of more than 2,100 households by an Indian physicians group found mothers in villages 1.5 miles from the mines reported congenital deformities more than 80 percent higher than the rates just 20 miles (32 kilometers) away, with reported child death rates from such abnormalities more than five times as high.

Independent Experts

The court order stopped short of requiring independent experts to conduct long-term studies of village health issues to get to the bottom of the mystery, which had been called for by outsiders, leaving the probe in the hands of the company. Uranium Corp. "is at liberty to take assistance of any expert, as they deem fit," according to the document, issued on Aug. 7 by

Chief Justice R. Banumathi.

One Indian nuclear power expert who has been following the matter said he doubted that leaving the investigation with the company would resolve the issue. "I can't imagine any UCIL committee would find a problem with their Jaduguda operations," said M.V. Ramana, a physicist and India nuclear-energy specialist at Princeton University's Nuclear Futures Laboratory, said in an e-mail interview, using an alternate spelling of Jadugora. "The only way this could provide any meaningful input into the debate over whether there is cause for concern in UCIL operations is if the court orders were very specific."

Biased Findings

Uranium Corp. Chairman Diwakar Acharya told Bloomberg News in a July 14 interview that physically deformed people living near the mines may have been "imported from elsewhere" to smear the company's reputation. Activists and doctors come with an agenda to Jadugora, he said, dismissing as biased any findings of a correlation between the mines and deformities in nearby villages.

Sen, the lawyer, had earlier said he was considering asking for an independent investigation. However, there weren't any freestanding agencies in India with the expertise to carry out the studies, Sen said.

"No foreign agency will be allowed to monitor or study the nuclear industry and no court is going to even consider that suggestion," Sen said in a telephone interview on Aug. 19. "So let Uranium Corp. do the study and let's see what it says. Their report is not final and the court

has the option to either accept it or reject it."

During the hearing this month, officials from Uranium Corp. and the Department of Atomic Energy assured the chief judge of the high court there were no threats to the environment or the health of people near the mines, said Rajesh Shankar, the lawyer representing the Jharkhand state government.

Not Satisfied

"The court was not satisfied, because these congenital diseases are occurring, mainly with children in that area," Shankar said in a phone interview on Aug. 19. "These things can't be denied, these things are there in that village."

Uranium Corp. spokesman Pinaki Roy didn't answer two calls and a text message to his mobile phone yesterday seeking comments. An e-mail to Acharya and Roy went unanswered.

The court chose Uranium Corp. to form the inspection team because it has expertise in the subject, said M. Khan, an assistant solicitor general of India and the lawyer representing the federal government and the Department of Atomic Energy.

"They're regularly inspecting and monitoring the matter," Khan said by phone on Aug. 19. "They are examining everything, whether there's any effect of radiation or not. That's why the direction is that UCIL, with the cooperation of other state institutions, will make the inspection and they will submit the report."

Doubtful Job

Ramana of Princeton said a proper investigation would include a thorough survey of diseases both in villages near the mines and

those farther away; extensive measuring of a broad range of potential contaminants in the environment and inside peoples' homes; and a careful examination of water, soil and food. Ramana has written extensively about Jadugora and has previously called for testing in the area to explain the apparent cluster of physical deformities.

The court in its order said doctors and experts should be included in the inspection team. It didn't list what sort of scientific measures it expected the Uranium Corp.-appointed panel to carry out.

Swollen Heads

The health issue came to the attention of the High Court earlier this year after pictures of Jadugora's deformed children appeared in the Indian press. The court in February ordered Uranium Corp. to produce documents that might shed light on the health issues. The court noted then that children living near the mines in

Jadugora are "born with swollen heads, blood disorders and skeletal distortions."

Uranium Corp., which employs about 5,000 people in the mining and processing of uranium, has been operating the mines in Jadugora since 1967. It also runs the Turamdih mines about 12 miles away, near the city of Jamshedpur, which has a population of more than 1 million.

India plans to increase nuclear power generation capacity 13-fold to 62,000 megawatts by 2032. Of the nation's 20 nuclear reactors currently in commercial operation, half are eligible to use imported uranium under International Atomic Energy Agency rules, Jitendra Singh, an official in India's prime minister's office, said in a written reply to questions in parliament on July 16.

The 10 others need locally produced fuel, he said.

—Editors: Jason Rogers, Andrew Hobbs

Death in India Lurks in Poisoned Water on the Rim of Coal Fields

By Rakteem Katakey
Rajesh Kumar Singh
Bloomberg News

December 5, 2014 – Death crept without warning to the mud huts of Jogaeal in central India.

One by one, children began to die, often in agony and exhibiting similar symptoms: convulsions, burning pain in the extremities, nausea, vomiting, fever and diarrhea. By the end of 2011, parents buried 53 of them in this forested hill country village occupied mostly by subsistence farmers and day laborers.

That scenario played out in three other villages in and around the contiguous coal-mining districts of Singrauli and Sonbhadra about 600 miles (965 kilometers) southeast of New Delhi. At least a dozen more kids with similar symptoms succumbed, along with several adults. Outrage at the deaths sparked an investigation by the chief medical officers of the Sonbhadra district regional government – and the results only deepened the outrage.

Most were tied to drinking polluted water, according to reports obtained by Bloomberg News in October. They stopped short of identifying the pollutants but independent scientists who have conducted exhaustive toxicology tests in the region say they know the



A woman complaining of muscle pains consistent with metal contamination waits in a hospital in the Sonbhadra district of Uttar Pradesh, India.

Photographer: Redux/Bloomberg

chief culprit: mercury.

An October 2012 study by the New Delhi-based Centre for Science and Environment, a public-interest research group, found mercury levels in some village drinking water samples to be 26 times higher than the Bureau of Indian Standard's safe limit for human consumption. Fish taken from a lake near villages where residents routinely catch and eat them showed mercury levels twice what the Indian government deems safe, according to that report.

The Indian government has long been aware of this. In a three-year study conducted in 1990s, the state-run Indian Institute of Toxicology Research found dangerous levels of mercury in



A factory in Anapara in the Sonbhadra district of Uttar Pradesh, India.
Photographer: Redux/Bloomberg

blood, hair and nails of people in the Singrauli region. Yet pollution continues to grow. United Nations data show India is second only to China in annual mercury emissions.

Corporations First

All of this reinforces the criticism that India's drive to modernize through extractive industries such as coal and uranium mining puts the priorities of corporations ahead of the health of its citizens.

India doesn't yet "include the cost of the effects of pollution on human and ecosystem health at all" when it performs cost-benefit analysis for industrial projects, said Kritee, a Colorado-based senior scientist at the U.S. Environmental Defense Fund who has studied mercury pollution for years. Until that changes, "environmental and human health will come second," according to Kritee, who uses only one name.

Statistics back this up. The World Bank estimates that environmental degradation costs India 5.7 percent of its gross domestic product every year – and is responsible for about a quarter of the 1.6 million annual deaths among children.

How mercury and other pollutants got here is no

mystery. What these victims shared was proximity to the sprawling Govind Ballabh Pant Sagar reservoir and the rivers that feed it. Flanked by mines, coal-burning power plants and heavy industry, these waters collect toxic effluent from plant discharges and absorb mercury that's a residue from burning coal.

They are ranked by an Indian government report as among the most polluted waters in the nation – and they serve as the region's chief source of drinking water and fish. The reservoir is the region's "main source of water" and "is seriously polluted with discharge of fly ash and other effluents from the industries," according to the National Green Tribunal, created in 2010 by the Indian parliament to address environmental concerns. "There are thermal power plants and nearly 1,000 other polluting industries. This position is really not in dispute."

Warning Signs

"The symptoms of mercury poisoning have already started showing in people in the area and it's time the authorities need to sit up and take notice," said Ramakant Sahu, a Centre scientist who helped to conduct extensive testing for toxic chemicals. "Mercury and other metals have been accumulating for years. The warning signs are all there."

No one knows the full extent of pollution-related illnesses and deaths in these villages because no government agency has conducted the kind of exhaustive study required to get to the bottom of the matter. Amarendra Bahadur Singh, the current chief medical officer of the Sonbhadra district, said he planned to recommend such a study to his superiors.

The non-profit Centre estimates that many of the 1.1 million residents who live in proximity to the

reservoir and its tributaries may be at risk.

India's Ministry of Environment and Forests plans to aggressively attack the nation's pollution problems with a soon- to-be-rolled-out requirement that all companies that emit pollutants install sensors at discharge points, said federal environment minister Prakash Javadekar in response to a Bloomberg News inquiry about pollution issues in the mining districts. The system, for which the government hasn't set an installation deadline, will give enforcement agencies around- the-clock ability to monitor violations "in real time and take action," said Javadekar. "That will be a revolutionary step."

Dread in the Villages

The events in Dadihara, about 35 miles from Jogaeal, illustrate the fear and confusion that run through villages where industrial contamination of water is blamed for illness and death. In November 2011, 7-year-old Subhash Chand grew desperately ill.

First came convulsions, then pains in his limbs so searing that he cried throughout the night, tended by his mother Leelavati who squatted beside him in the courtyard of their red- tiled hut. In the morning she carried him five miles to the local government hospital where doctors prescribed malaria medicine and sent them home.

When the convulsions flared again, they put Subhash on a bicycle for a return to the hospital. He died en route. His mother buried him in the woods near his home. Autopsies are rare here and there is no official cause of death. Yet residents here, where several adults have also sickened and died, now believe the water was the culprit.

"The doctors said it was because of dirty



Soni, 12, whose feet and hands sometimes feel as though they're on fire, has begun to exhibit signs of what Centre scientists said they fear is mercury poisoning, based on tests they ran on her.
Photographer: Redux/Bloomberg

water," said Leelavati, holding a soiled photograph of her son, his only remembrance. "We buried all his belongings, the medical papers, his shoes and his clothes. The sight of these only added to our grief."

That mercury can be deadly is well known. The most infamous example is the 1956 poisoning in Minamata, Japan, which eventually killed more than 1,500 people who ate fish contaminated by mercury dumped into a bay by a Japanese corporation. Mercury's harmful effects include brain damage, lack of coordination and seizures, according to the U.S. Agency for Toxic Substances and Disease Registry. Tingling or burning sensations of the extremities are common.

Missing Water Trucks

For many, India's Ministry of Environment and Forests plan to curb industrial pollution is overdue. According to the Centre's Sahu, efforts by the central and regional governments to curb

on fire – has begun to exhibit signs of what Centre scientists said they fear is mercury poisoning based on tests they ran on her.

Scenic Pollution

Seen from the air, Govind Ballabh, among India's largest man-made lakes, is a placid expanse of scenic green, stretching more than 30 miles southwest from the towering ramparts of the Rihand Dam. Leggy storks and shorebirds forage its banks. Carp and catfish, prized by local subsistence fishermen, ply the murky depths.

Up close, this impression gives way to a less pastoral reality. Ringed by vast coal mines and belching power plants, Govind Ballabh makes possible the industrial ambitions of a region that annually provides about 5 percent of India's total power capacity.

Spills of coal ash -- also known as fly ash -- often darken the lake. Chemical and other companies dump toxic effluent into the reservoir's waters and power plants produce mercury along with electricity. The mercury mixes with organic compounds that turn it into methyl mercury – more toxic to humans and animals, say scientists, because it is more ingestible.

The dam and reservoir were inaugurated in 1962 by India's first prime minister Jawaharlal Nehru as the nation began a modernization push. The project was initially meant for hydroelectric power and irrigation to the region. After the discovery of vast coal reserves, mines, factories and more power plants followed.

Some residents are old enough to remember the days when the rivers ran clear and the reservoir flowed free of contaminants. "We've been drinking this same water for years," said



Waste pours into the reservoir in the Sonbhadra district of Uttar Pradesh.
Photographer: Redux/Bloomberg

dangerous pollution and address collateral issues have been fitful and ineffective.

Polluters are occasionally issued shutdown warnings by regional environmental watchdogs but actual shutdowns and fines are rare, said locals and scientists who've studied the region. There has been no meaningful effort to clean up the lake.

Measures to protect villagers against having to drink contaminated water often meet with failure. In May, for example, the National Green Tribunal ordered companies operating in the Singrauli and Sonbhadra mining districts to truck in clean water to residents in the wake of continuing outbreaks of polluted- water-related illnesses.

Yet locals say they often don't see the tankers for days or weeks. "They don't come and we must drink the water we have," said Tejbali, a resident of the village of Kirwani who sometimes rows his boat across the reservoir to take a day job at a chemical plant.

His 12-year-old daughter, Soni -- whose feet and hands sometimes feel as though they're

Tejbali. Mercury can't be seen or smelled in food or water. Nor can arsenic and the slew of other heavy metals that have been found in toxicology tests here.

"The children want to eat fish and we get it from the reservoir," said Tejbali, who goes by one name. "How can I deny them?"

Confirmed Contamination

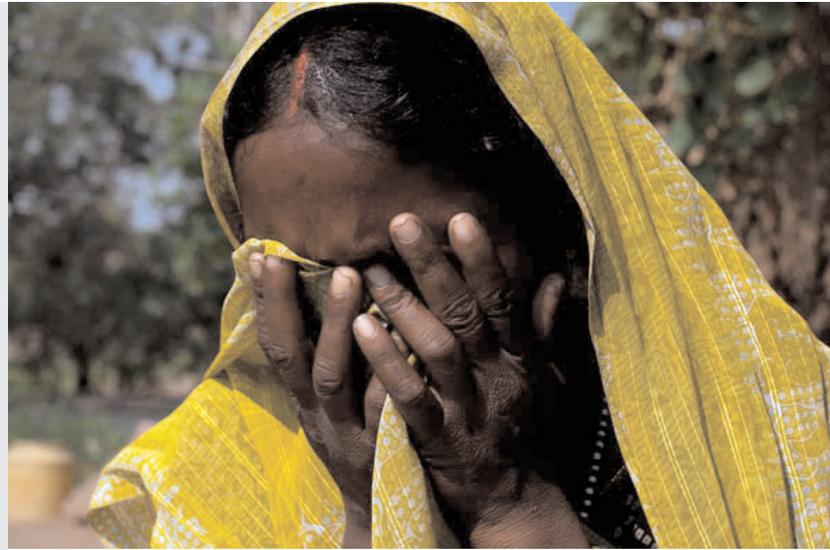
It was the death of so many children in 2011 that convinced residents that something far more sinister was at work than the normal litany of factors -- poor hygiene, malnutrition and substandard medical care -- that contribute to high mortality rates here from diseases such as malaria, polio and influenza.

Investigators dug in and concluded the villagers were right. In those two separate reports obtained by Bloomberg in October, the chief medical officers of the Sonbhadra district blamed polluted water of the reservoir and other water bodies in the region for the deaths.

"The hand-pumps in the villages mostly didn't work and the villagers were dependent on wells for drinking water," according to one of the reports. "Because these wells were very close to the Rihand reservoir, it's possible the polluted water of the reservoir seeped into the wells."

"All the villages around the dam are in danger," said Rajeev Ranjan, the head doctor at the 30-bed government hospital in Myorpur, who was a witness to the deaths in Dadihara and another village. "It is confirmed the water is polluted, it's contaminated."

Ranjan's boss, Singh, the Sonbhadra district's current chief medical officer who is recommending to his superiors a "multi-



"We buried all his belongings, the medical papers, his shoes and his clothes. The sight of these only added to our grief," Leelavati said.
Photographer: Redux/Bloomberg

disciplinary study on this," said companies should be held accountable for pollution if a study confirms widespread contamination. "It's not within my right to go and stop anyone from dumping garbage in the water bodies. But if we have enough evidence, we can build a case against this practice," said Singh.

Suffering in Kirwani

It will not come too soon for many villagers experiencing the dread and anxiety that they or their relatives will be the next to fall. In Kirwani, a pastoral hamlet ringed by factories, Tejbali has to constantly watch his daughter Soni.

On many days, she seems normal, attending school and playing in the fields fronting the mud hut she shares with seven others in her family. And then there are the bad days when she screams in pain as spasms wreck her left arm and leg. The burning in her limbs adds to her agony. She's begun to stumble when she walks. Seizures that began four years ago have become



Water treatment in the Sonbhadra district of Uttar Pradesh.
Photographer: Redux/Bloomberg

more frequent.

Standing in their darkened two-room hut, his face illuminated by a flashlight, Tejbali wondered aloud how long his daughter can survive. “It’s painful,” he said, lights from a chemical plant flickering across the Govind Ballabh reservoir. “But what can I do? I don’t even know what’s wrong with her.”

Down a path in the same village, 55-year-old Panna Lal exhibits similar symptoms. He’s forced to bathe in hot water even on summer days that are more than 100 degrees Fahrenheit (37.8 degrees Celsius) because cold water increases the pain in his legs. When the burning is intense, he wets a cloth and wraps it around his feet.

“It feels like a fire inside, feels like I’m walking on burning coal,” said Lal, seated and fanning away mosquitoes in the courtyard of his tiny brick house, a single yellow bulb providing light. His wife and daughter are sick with similar symptoms.

Some of India’s biggest corporations operate in these corridors of pollution. Coal India Ltd., the world’s largest coal miner, controls more than one billion tons of reserves here through a

subsidiary, Northern Coalfields Ltd.

NTPC Ltd., the Indian national power company, runs coal-powered electricity plants. Another state-run enterprise, Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd., operates a 1,630-megawatt coal-powered plant near the town of Anpara.

Northern Coalfields follows Indian mining regulations in the operations of its mines and mining dumps, said Tapas Nag, Northern Coalfields’s managing director. Nag said he believes reports of high rates of diseases in the mining districts are exaggerated. “Maybe there is some misconception based on some reports earlier by some NGOs,” he said.

A spokesman for state-run NTPC said it adheres to all environment rules and whenever the authorities point toward a violation, it takes prompt action to rectify it.

Uttar Pradesh Rajya Vidyut’s technical director Murlidhar Bhagchandani said the company operates its power plants and ash dumps in compliance with the law. “The ash dumps have been created with all the approvals...We invite independent agencies to do monthly checks on our environment compliance. We are constantly under the watch of the regulator.”

Fishing in the Fly Ash

To see what some residents are up against, a visit to Anpara is instructive. Tall towers belch a constant stream of smoke and steam into the air. Giant iron and steel pipes emerge from the plant, running about five miles, portions elevated on stilts, to a series of fields rimmed by low dikes. There, a slushy gray mix of ash gushes out with a

roar into dumps called ash ponds.

On a recent cloudy, humid afternoon, cows and goats roamed the ash fields and five school-age girls were building castles from the waste as an elderly man, sitting in his hut not 10 yards from the pond, tried to warn them away.

Fly ash, which contains traces of arsenic and low-level radiation, is a leading contributor to air, water and soil pollution and land degradation, causing “disruption of ecological cycles” while “setting off environmental hazards,” according to India’s Planning Commission, a government advisory organization headed by the country’s prime minister.

Ram Narayan Panika, 40, lives in one of two houses at the edge of the Anpara ash pond. Two decades ago, 100 houses crowded this field. Now it holds hundreds of tons of ash. His house is littered with the stuff.

“Everyone has left, and I will be forced to take my family away very soon,” he said, standing barefoot atop the slurry pipes that run above his house. “I think the ash has gone in to the water. It gets in to our hut, our food. It’s everywhere.”

He sometimes filters drinking water from a nearby hand pump through a cloth but often drinks it without filtering. Panika has pain and a burning sensation in his hands and feet, he says, while his 12-year-old son Pradeep Kumar has skin lesions.

The ash isn’t just a problem for Panika. When the ponds overflow, the ash ends up in the reservoir. Fishermen often wade in looking for their quarry, ignoring the pollution. On the day reporters spoke with Panika, a bare-chested man floated on a tire tube amid the ash, hoping to net fish.



Hardened ash next to the reservoir in the Sonbhadra district of Uttar Pradesh.

Photographer: Redux/Bloomberg

Shiv Balak, 20, and his wife, who work as construction workers, wade in to the gray chest-deep water, dragging out the ash and sand, packing it in to sacks once used for potatoes. He collects 80 rupees (about \$1.29) for every bag from a local contractor. They’ve collected 29 sacks today. Balak doesn’t know where the concoction is used.

“I’m healthy so far and I do what I can to earn some money,” Balak said. “The water and the sand come from the power plant so it must be dirty. I don’t have any health problems now, but who knows about the future.”

Sometimes, he pulls out dead fish from the pond. He doesn’t always eat them – but sometimes he does.

– Editors: Jason Rogers, Ken Wells, Will Wade

India Loses Student Engineers on Sand Mafia Path to Deadly River

By Tom Lasseter
Rakteem Katakey
Bloomberg News

December 17, 2014 – The Indian college kids on break would never have reached that alluring spot on the Beas River without a lane carved by trucks and tractors operated by a network of criminals known as the sand mafia. But there it was. So they filed from their tour bus parked on the rural highway above and headed down the steep-cut banks.

It was Sunday, June 8, a warm day in the Himalayan foothills near Thalout, a dot on the map in the north Indian state of Himachal Pradesh.

The patch of river looked perfect, especially after a long and aggravating bus ride. Wearing its summer demeanor, the Beas glimmered -- a broad, silt-green, slow-flowing expanse of placid water fed by snowmelt from a cloud-shrouded mountain lake about 45 miles (72 kilometers) upstream.

Raman Teja Venigalla, a 20-year-old with a mop of dark hair, waded in. He lay down in the shallows, luxuriating in the cooling eddies. His classmates fanned out around him, climbing over rocks and boulders as far out as midstream. Students gazed up at light cascading off the canyon walls, the sun drifting toward the horizon.



The Larji Project office complex rises above the river and across the highway from where the students drowned.
Photographer: Tom Lasseter/Bloomberg

Venigalla's first hint of danger came from men on the shore collecting sand who began to point and yell. Wind muffled their warnings until "I heard the word 'dam,'" he recalled.

Within minutes, the Beas turned into a monster of fulminating whitewater as crews at a towering dam of the Larji Hydroelectric Project opened its gates less than a mile upstream. Caught unawares, many of the students were swept away – the horror was captured on video by a wedding photographer on a hill above.

Venigalla, a leg catching on rocks, survived. Twenty four others drowned -- half of the 48 that had come. Their bodies, bruised and swollen, would be returned to their stunned families in wooden coffins days and even weeks later.



Baswaraj Veeresh lost his son, Sandeep, who was among the 24 students from Hyderabad's VNR Vignana Jyothi Institute of Engineering and Technology who drowned. He stands in front of a portrait of Sandeep in his home on the outskirts of the city. Photographer: Tom Lasseter/Bloomberg

Blame Game

As engineering students at Hyderabad-based VNR Vignana Jyothi Institute of Engineering & Technology, these were the kids with plans to build or run companies, invent apps, see and change India and the world. Entire families made sacrifices to enable their dreams. Kasarla Rishitha Reddy's father moved three generations of relatives across the packed chaos of Hyderabad just to shorten her commute. She drowned that day.

In interviews, the students' parents have blamed the engineering school and the tour operator; the tour operator and an official investigation have blamed the dam's operators; the dam's operators insist the investigators' conclusions are "wrong" and "without any basis."

Yet among the incontrovertible facts to emerge in the aftermath is that this place of tragedy should never have been accessible. The sand mafia, a ubiquitous presence up and down the Beas, ran a brazenly open and illegal operation here, across the highway from the engineering and staff offices of the Larji Hydroelectric Project.

That's according to witnesses who saw it, interviews with Larji Hydroelectric officials who say

they were helpless to stop it and court documents obtained by Bloomberg News.

How the sand mafia did so with impunity remains an unanswered question in the Beas River drownings. So does the issue, raised in the Indian press and in filings before the Himachal Pradesh High Court, of whether anyone with the Larji project had been cooperating with the sand mafia to artificially boost water releases – flushing out more sand for the mafia to steal.

Across growth-driven India, sand – cheap and plentiful in much of the world – is gold to the construction trade which uses it to mix cement. The sand mafia has been known to ravage riverbeds with heavy equipment to loot sand and sell it at steep discounts to builders, shaving hundreds if not thousands of dollars off construction costs.

Larji Hydroelectric officials and their superiors at the Himachal Pradesh State Electricity Board flatly deny collusion. In interviews, officials of both agencies said they had reported the Beas River sand mafia operation to the regional mining office and the police. Nothing changed.

The plundering ways of the sand mafia are well known. Last year, an Indian government-anointed legal advocacy group, the National Legal Services Authority, filed litigation in India's Supreme Court alleging the government's failure to control the sand mafia has had "disastrous consequences," allowing destruction of farmland, drinking water supplies and riverbeds.

It's a recurring theme in India, where since the 1960s a quest for growth coupled with lax regulation and tepid enforcement of extractive industries – uranium, coal and sand- mining among them – has raised cries for reform.

A court whose jurisdiction includes the uranium mining center of Jadugora earlier this year ordered a state-run mining company to determine whether its operations are responsible for sickening and killing village children there. Water tainted by industrial effluents including mercury has been linked by scientists for the Centre for Science and Environment to the recent deaths of dozens of children in India's central coal-mining regions. A regional medical examiner there is urging a comprehensive government study to get to the bottom of the deaths.

In its lawsuit calling for action against India's sand mafia, National Legal Services said, "the illegal trade is driven by the unholy nexus between contractors, politicians, trade union leaders, panchayat (local officials) and revenue officials and corrupt policemen."

The court filing, which doesn't name individuals, demanded a crackdown on the sand mafia by state governments and the national ministries of mining, law and the environment, noting that "it is widely known and recognized that this invidious activity has been flourishing in collusion with the police and enforcement authorities and patronage of local politicians."

People with alleged ties to the sand mafia have also been charged with violent crimes in a number of jurisdictions. That includes the murder of an activist who dared to stand up against them, according to police and court documents obtained by Bloomberg News.

Well-Deserved Break

Exams at Vignana Jyothi Institute, on the dusty edge of Hyderabad, ended on June 1. Two days later the engineering students headed up north for



The Beas River in more placid times. This is just downstream of the site of the drownings, where the sand mafia ran an unauthorized sand-mining operation in sight of the office complex of the Himachal Pradesh State Electricity Board's Larji hydroelectric project, sitting above the river on the left.

Photographer: Tom Lasseter/Bloomberg

a break. The city had been baking in 100-plus degree Fahrenheit heat (37.8 degrees Celsius) for a week. The kids wanted a rest.

Baswaraj Veeresh took his son, 20-year-old Baswaraj Sandeep, down to the train station that Tuesday evening. They had to borrow a neighbor's car – Veeresh drives a motorbike and there wasn't room for luggage.

To keep Sandeep, as he called himself, in college for his first two years of study, Veeresh had already spent 205,000 rupees (\$3,230). It was half of his savings and it was clear the account would be empty by the time his son graduated. Still, he'd handed over 8,500 rupees for a seat on the trip.

"Be careful," Veeresh said to Sandeep, whose ears stuck out a bit, just like his father's. The students clambered on to the hard blue sleeper seats of the Nizamuddin Express. As the train began to roll north, a night breeze blowing through open metal slats in the windows, they played cards, sent text messages and gossiped, letting the stress of home fade.

It takes more than 26 hours to rumble across

some 920 miles to the city of Agra, where the Taj Mahal stands. From Agra, they boarded two tour buses to New Delhi and then continued north to Himachal Pradesh -- a favorite summering spot for British colonialists.

As the plains rose into mountains, and the banana trees gave way to towering pines, the buses climbed from 700 feet (213 meters) above sea level to about 7,000 feet.

They finally reached the state capital of Shimla. In a snapshot taken the evening they arrived, a group of students stand beneath a set of Victorian-style streetlights, a neon bar sign casting a glow on the restaurant on their left. Everyone is smiling. Behind them, lights twinkle on a hillside.

Small-Timer Exceptions

In a nook of the rounded, tree-clad foothills rising above the Beas, Gauru Ram sat in the dimness of a tea stall, a shanty whose ceiling was propped up by four worn log beams.

Outside, a footbridge stretched across the Beas's lulling waters. Two men on the river below filled sacks with sand, strapping them to the backs of four donkeys. Ram, taking a drag on a cheap cigarette, said he was their boss. There are no sand-mining permits awarded here, according to regional mining officials interviewed by Bloomberg News, but Ram said his job is necessary.

In Himachal Pradesh, the roads often squeeze to a single lane, slowing traffic to a crawl as one vehicle waits for another to pass on steep, twisting mountain passes. Everything must go up the mountain -- barefoot holy men in saffron robes, six-wheeled dump trucks sagging from the weight of gravel, porters carrying crates of apples lashed to their shoulders, and one tourist bus after the next.

It takes almost an hour to groan the 22 miles from the nearest town, Mandi, to this spot, outside of Thalout, where tea stands are among the few diversions off the highway. To put up a new building that clings to a cliff side -- as most do here, whether a three-story car dealership stacked like a wedding cake or a modest home -- means hiring trucks to haul sand to mix into concrete.

Avoiding the cost of buying sand from a licensed business shaves 30,000 rupees from the cost of a house, said Amar Singh, who runs a grocery stand in the area. That's significant money in India, where gross national income per capita is about \$1,500 a year.

Some officials make a distinction between unauthorized small-bore sand mining done by workers using shovels and mules and the industrial-level depredations often associated with the sand mafia.

Rajender Singh, director of industries among the state's most senior officials in charge of mining, said it's unreasonable to expect small timers to meet national requirements for environmental approvals.

Without the informal sand-mining trade, "construction activities would have come to a stop," said Singh, a man in a snug blue wool vest sitting behind the desk of his office in Shimla. "A little bit here and there -- I don't mind saying that."

In the tea stand, when talk turned to sand mining efforts that use trucks and industrial tractors -- like the large sand-mafia operations -- Ram, 42, broke off the interview without another word.

Frustrating Trip

The bus carrying the students left Shimla in the morning. The trip was troubled from the start.

The bus driver demanded advance payment from one of their professors, who didn't have the cash with him. A punctured tire stranded them for at least an hour.

Worried about making it to the town of Manali in time for a river-rafting trip, some of the students asked whether it was going to happen. "It depends on if you people want to have lunch," was the driver's reply.

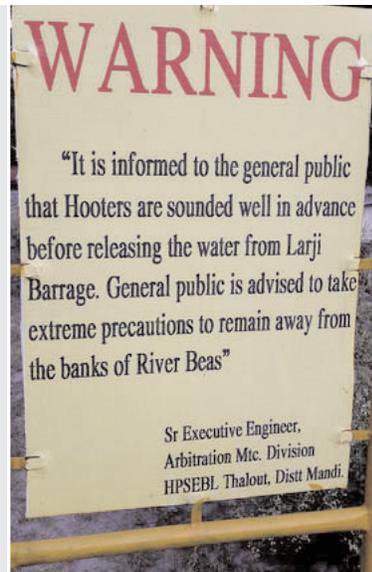
They stopped at about 4 p.m. to finally eat something. The compartment holding the food was stuck. It took about half an hour with a crowbar to get it open. Baswaraj Veeresh called his son, Sandeep, at about 5:15. They'd just finished lunch, Sandeep said. "I made a mistake by coming," he told his father.

Sometime before 6:30 p.m., the bus pulled over again. Someone had to use the bathroom. Someone wanted to take photographs. The driver steered into a stretch of open space on the roadside, next to a red, corrugated tin hut with bags of snack chips. White lettering above the doorway identified it as the Thakur Tea Stall.

The students filed out one-by-one. There were no warning signs, just a path down to the ankle-deep Beas reached by a short walk across the sand.

They removed their shoes and rolled up their jeans, hopping across rocks, taking in the scenery, craning their heads to catch glimpses of the mountain peaks.

They pulled out cameras. One shot captured Ashish Mantha, 19. He was a popular kid recovering from family heartbreak – his father died of a heart attack last year. There he was, crouched in front of 11 friends, mostly young women, his hands thrown up in greeting, a goofy grin on his face. The river flowed behind them.



A sign warning passersby to stay away from the Beas River site of the June 8 drowning of 24 Indian college students near Thalout, India.
Photographer: Tom Lasserter/Bloomberg

The sun ambled toward the horizon, soft light sliding down the canyon walls. In the background, a truck was rumbling along the banks.

It was during those moments of calm that Raman Venigalla waded into the water.

History of Violence

When the sand mafia doesn't get the cooperation of officials, things can turn ugly. In 2013, after a bureaucrat in the south of Himachal Pradesh began leading raids against illegal sand mining, tractor drivers attempted to ram his jeep that June, and in July and then again in August.

During the last confrontation, said Yunus Khan, a tractor laden with sand came roaring from behind at about 4:45 a.m. on a bridge. Police confirmed that the driver was arrested for obstructing a public servant from enforcing the law.

"It's not a safe job," Khan said in a series of telephone interviews. "When we tried to stop people, we were attacked... We are bound by law and we are doing our duty, and during the course of action, if some people are hurt by the crackdown of district authorities, they can do

anything. Those people, they can do anything.” Khan was transferred to the state capital of Shimla for a more senior position.

The brutality has ended up on the doorsteps of the nation’s capital. Paleram Chauhan, a 52-year-old farmer, was among a group of activists in an eastern suburb of New Delhi that had petitioned the local government, filed a lawsuit and called the cops to try to shut down a sand-mafia operation that was damaging their crops near the Yamuna River.

In July 2013 in broad daylight, three men pulled up on a motorbike in the alley behind Chauhan’s house. At least two of them crept into his bedroom, using his unlocked, orange-painted front door to gain entrance. They pulled guns and riddled his body with bullets.

Four men face murder charges, according to police reports. During the brief spike of coverage in the Indian press that followed, officials visited the family home to offer condolences – and to advise the family to not push too hard for an investigation into the sand mafia or the murder, said Chauhan’s brother, Pratap Singh.

“This was written, this was destiny,” Singh recounted them saying. “If you take it forward maybe there will be more tragedy.”

Water Without Warning

The first blast of water – accompanied by the roar of rapids – hit the students just after 6:35 p.m.

Venigalla tried to get away. He saw four classmates stranded on a boulder, clutching one another as the river rushed past. There was nowhere to go. The small rocks they’d skipped across to reach the boulder were already under water.

“I was looking into their eyes and they were looking into mine,” Venigalla recalled later. The moment didn’t last -- a wave knocked him off his feet and the river dragged him down.

He was a moment from being swept away when his left leg jammed between two rocks, like a piece of driftwood. Luck saved him and then someone pulled him out.

Chetan Chavan, 20, remembered chatting with one of the two professors who accompanied the trip. They had come down the path together and were standing on a rock close to the bank when the water suddenly surrounded them. “You can swim?” the teacher asked him.

They both could -- and thanks to their proximity to the bank, they made it out alive.

Chavan looked over at one point to see his friend, Kalluri Sree Harsha, also 19. He was in a blue-check shirt and jeans, standing in the rising water.

“He was very calm, he just closed his eyes. He knew what the outcome would be. He let the water take him,” said Chavan. Ashish Mantha had also made it up on a rock, not long after he’d posed for that group snapshot. He, too, was washed away.

Adithya Kashyap, the second professor on the trip, was up at the Thakur Tea Stall, asking the bus driver where the tour operator had gone. A man ran over, yelling that the river was rising.

Kashyap, a heavysset 30-year-old fond of untucked shirts, hustled part way to the river, and then saw another man throw a rope toward struggling students. He turned back in frantic confusion, wishing he could find a rope as well. There was none.

“What was happening? What to do?” he

thought.

He caught a glimpse of a cluster of his students trying to keep their footing on a rock: “They tried to hold each other but they couldn’t save themselves,” said. His gaze fell on Sandeep Veeresh, standing on a rock, looking terrified. And then Sandeep was gone.

Minutes to Kill

The deluge appears to have taken only five to ten minutes to kill the students.

That was among the conclusions of an investigation by the Divisional Commissioner’s Office in Mandi, the chief representative of state government where the drownings occurred. It mentions illegal sand mining but does not draw a connection between that activity and the drowning deaths. The 47-page report said that Larji project operators had erred by letting water behind the dam rise too high, thus necessitating the huge release that killed the students.

A magistrate court in Mandi, the nearest town to the drownings, is also holding hearings on the flood. “The main aspect was the negligent act of the dam operators,” said K.C. Rana, the district police official who oversaw an investigation for the court. In an interview, Rana said he had found no evidence of collusion between the sand mafia and Larji project workers.

The State Electricity Board, which ultimately oversees the dam, objected to the operator-error findings. A Larji power project official insisted in an interview that the discharge was unavoidable because water levels had gotten so high that they flooded a town rimming the reservoir and could have undermined the dam itself.

Yet documents submitted by the Electricity

Board’s own officials to the Himachal Pradesh High Court labeled accounts of flooding in Aut “imaginary” and said that “the alleged rise in water level” took place “much after the time of the accident.

The board’s filings also blamed the swollen reservoir on water releases from another hydroelectric plant, known as Parbati III, on a tributary of the Beas. Yet logs from the other hydroelectric plant, filed in evidence, show that its water discharges were minimal during that period and couldn’t have contributed to the high levels of the Larji reservoir, C.B. Singh, Parbati’s general manager at the time, said in an interview.

Documents from the Electricity Board concluded that the path used by the students to reach the river was built by the sand mafia. There was no siren blast to accompany the water release -- or if there was, it wasn’t audible downstream, according to interviews at the site and witness accounts in the Divisional Commissioner report.

The report also said locals on a cliff high above the river and Manoj Kumar, a caretaker for a nearby substation, attempted to warn the students of danger. Kumar, who speaks with a heavy accent, said in an interview that he was outside his house above the river and that the kids didn’t appear to understand him.

Students interviewed by Bloomberg News said that no one told them to stay out of the river or urged them to flee until the waters were already upon them.

Dilip Sharma, a lawyer appointed by the High Court, declined to comment saying he didn’t want to add to “publicity” surrounding the deaths.

Parents of the students retained a lawyer, blaming the VNR Vignana Jyothi Institute, the



Kasarla Rishitha Reddy was among the victims. Her parents, her mother, K. Shobha, and father, K. Krishna, stand to either side of her portrait in their home in Hyderabad.

Photographer: Tom Lasseeter/Bloomberg

engineering school, for a field- trip gone terribly awry with its malfunctioning bus and hiring a tour guide who knew nothing of the Beas River area. The college administration declined an interview request.

Murali Krishna, who signed documents as proprietor of the Hyderabad tour agency, said there were “minor issues” with the bus and a spat over the payment but the company -- now, according to Krishna, out of business -- wasn’t responsible for the deaths, he said. “It’s the dam people, because they released the water and there were no signboards and there was no siren,” said Krishna, who also served as a tour leader.

The families received about \$8,000 in High Court-ordered compensation per student, half paid by the engineering school and half by the Electricity Board, but plan to push for a higher sum, said their lawyer Suneet Goel.

K. Krishna Reddy, the father who relocated his family to make his daughter’s studies easier, said in an interview that one thing is clear: “If those roads didn’t exist, our children wouldn’t have reached the river and wouldn’t have died. The sand mafia is one of the culprits.”

Signs and Suspicions

Across the highway from the utilitarian Larji Hydroelectric offices, a warning sign and barbed-wire fences now mark the spot of the Beas River drownings. The same signs also dot the road along the river in various places.

P.C. Negi, managing director of the State Electricity Board, said signs that once existed where the drowning occurred had previously been torn down by vandals.

On the ground, puzzlement and suspicion abounds. There are no permits to legally mine sand in the area, said Kulbhushan Sharma, the head government mining officer for Mandi district where the Larji project is located and who is in a position to know.

The presence of the sand mafia operating so openly across from the offices is difficult to explain. “Being a part of the government they should not allow such activities on their land,” said Singh.

From his seat in the tea stand, Jeevan Ram Thakur, a 28- year-old official who oversees a number of villages in the hills surrounding the Thalout area, has seen and heard much.

The sand mafia in the area is alive and well, he said. While there is no preannounced daily schedule of when the water from the Larji dam will be released, the sand mafia trucks always “seem to know when the water will come,” especially big releases, according to Thakur.

Reflecting on the drownings, he has an opinion. “The electricity board, the administration and the sand mafia – in that area, all of them are responsible,” he said.

A Father’s Grief

The dead had big plans.

Kalluri Sree Harsha, tall and handsome with high cheek bones, wanted to get his master's degree in the U.S. and return to India to start a company.

Ashish Mantha planned to start an aerospace club at school and, after graduation, join his older brother to study in the U.S. – it was their late father's wish that they both get Ph.Ds.

Kasarla Rishitha Reddy had been in a flash mob dance video filmed at a local shopping mall and loved to sing. Her mother, K. Shobha, recalled that she wanted Rishitha to get married after college: "She said no, after graduation, MS" – a master's of science degree.

From the living room of his courtyard house in Hyderabad, Baswaraj Veeresh, Sandeep's dad, remembers the 1 a.m. mobile phone call from the police days after his son had disappeared. The

body had been found. Police texted him photos. There were Sandeep's feet – one still in a white and black tennis shoe, the other in a brown sock.

Veeresh, a large photo of Sandeep looming high on the wall above him, offered a chronology of his son's life, pausing sometimes to weep quietly.

Some parents held out desperate hope that their children might simply be lost in the hills of Himachal Pradesh. Veeresh, 51, had no such illusions. He had called his son's mobile phone "20 or 30 times."

And he knew something else. Sandeep, he said, couldn't swim.

– Editors: Jason Rogers, Ken Wells, Will Wade