Chapter 8: Uttranchal: Watery spirits

Tungnath's craggy peak towers some 13,500 feet above sea level. It's the highest of the five dhams, or places of pilgrimage, in the Himalayas. The others are Kedarnath, Badrinath, Rudranath and Madamaheshwar. It's easy to miss Tungnath, but the view from the peak is to die for. Stretched against the eastern sky are the two better known naths and Neelkanth. On a clear day, says my friend and guide on the Himalaya journey, Ramesh Pahadi, you can see the snow covered hills from Uttranchal to Himachal. On the other side, towards the plains, lower hills clothed in forest stretch into the blue distance. I am too far into the Himalayas to see the plains.

Ramesh should know as he's been up and down the hills in the two states, documenting water resources, their history and culture, for several years. A Sarvodayee, the 55-ish man lives in a modest rented accommodation with his wife and one daughter. The elder one is married and lives in the plains of Uttranchal where, presumably, her husband has a job better than what he could get in the hills.

The Himalayas are the origin or India's major rivers that make up the world's most fertile, densely populated plain. The Indo-Gangetic plain, watered exclusively by mountains from the roof of the earth, have nurtured and supported a majority of India's population since the dawn of civilization. The rivers' fragile sources, high in the mountains or glaciers, have been some sort of threat for the past two centuries. And now, the pressure is beginning to tell.

Tungnath has the mandatory temple, a five-storey high stone structure topped by a flattened dome with a golden spire atop it. It looks impressive from a height, but from the entrance, I am less than impressed. It certainly does not look like something I would spend three hours climbing for. The peak is another matter, though. Another 1,500 feet higher, up a rutted winding path eroded by rushing water from rain or snow melt.

Winter snow is still on the ground just above Tungnath in two places. It's a diversion after the hour-long horse ride up the mountain to the temple – Ramesh has a game leg and decided to ride up; I followed, thinking this would be easier than hiking up. I wasn't exactly right as the horses often teetered on the brink of the precipitous path with a steep fall down the valley. Aryaman, my son, takes a break throwing snowballs at me. We decide at the temple to march and make the climb to Chandrasheela, as the peak is called. Ramesh and his wife have made the pilgrimage to pray, so they stay behind.

"I've been up there a few times. You must visit the peak though. It will take you 30 minutes up and 30 minutes down. We will wait for you here," he tells me encouragingly. From the temple, you cannot see the peak – the path up disappears over a rise in the mountain.

I think to myself, "That does not look too bad." And Aryaman and I start climbing.

“Dad, I am tired. I will wait here while you go and come,” says Aryaman, half way up. It’s an arduous climb for an eight-year-old. But there’s no way I can leave my boy on the hillside.

“Look, can you see that flag up there. That’s the peak. See how far we have come. It’s a shame to come all the way and then go back without reaching the peak. You can tell your friends about your achievement as well,” I try to encourage him. The air is too thin and he is too heavy for me to carry him up.

We walk a while, rest a while. There is very short grass and red and yellow wild flowers at this height. Nothing else grows – we are well above the tree line. The green carpeted hillside rolls away from us, smoothly it seems, on all sides to the trees far below. From the hillside along the path, water oozes, trickles down the rocks and disappears into the rubble alongside the path. The snow has just melted and the ground is saturated with water, that is slowly giving up. These tenuous trickles somehow percolate through mud and rock and wind up as the rivers that sustain half of India’s people. They are barely enough for animals to lick, not enough to fill a bottle from. But they are drops that make the mighty Ganga.

“See, these little drops of water. You remember the river we drove along to get here. Eventually, they will all merge together to form rivers like those and the Yamuna. This is where we get our water from,” I tell Aryaman.

He isn’t quite convinced – how many thousands of such oozes will it take to make a river. Of course, not all rivers come from the conglomeration of oozes; the larger ones are from glacier melts. But the water is part of the same cycle and flow. It does take some imagination to link these hillside trickles to the sustenance of life hundreds, even thousands, of kilometres away.

We make the peak eventually and clang the bell above the Chandrasheela temple, another pile of rocks with three idols inside. Behind the temple, on the small plateau atop the peak, earlier climbers have left their mark – little piles of rock signifying their desire for a better life in this material world. I wonder whether the gods will look kindly upon them. We add our pile to the collection there, embellishing it with a stick to indicate our love for forests.

Descending, we pass the Tungnath temple and enter the small settlement below it. It’s a collection of small dhabas that dole out fat-grained sticky rice and thin daal or potato-chana. The food tastes divine – blame it on the height and the pure rare air. Water is from a hill spring a few yards away, under a vertical rock face. The water makes the tea taste great. Just behind the dhaba are two small rooms with Rs. 50 written on each door. That is the rent for the room per night. For that, you get a small 12X12 room with a cotton mattress and a thick cotton quilt. I peer in, shudder at the prospect of sharing the room and the night with rats, and withdraw.

“It’s a great view from Chandrasheela in the morning,” says Ramesh. “If you want, you can stay here and return tomorrow.”

“No thanks,” I decline, hastily.

While Ramesh is finishing his repast, I walk down to the water source at the base of the settlement. A pipe stuck into the hillside is from where these 40-odd people get their water from. Water pours out of the end of the pipe and flows through a small pile of garbage down the hill, where it shortly disappears into the ground to reappear at regular intervals on the way down. But that wasn't the original source.

A couple of yards from the pipe is the dhara, the place where water used to collect and be used for various purposes – drinking, bathing and washing, in that order. A dhara is a rectangular or square manmade structure usually about 12 feet to a side and about 3-4 feet deep, that is built at a place where a stream flows out of a hillside. Usually, they are made of rock and have a solid bottom to prevent the water from seeping into the ground. The stream is channeled into spouts from where it fills the structure – the two spouts in Tungnath's case are made from brass, one of which is a beautifully carved bull's head and the other, an elephant head. Most others are similarly embellished. The water from the dhara's overflows into another holding area a few feet below and then onto a third one. There is a fairly well-defined pattern of use of water.

Water out of the spout is used exclusively for drinking and pours into the dhara, allowing people to fill their pots straight from the hill's mouth. Water collected in the dhara, where people bathe or wash clothes. It is only the four varnas, or castes, who are allowed to use this water – no outcastes, animals or women with periods allowed. The overflow from this dhara that collects a few feet below in another receptacle where the rest of humanity – outcastes and women with menses – can use the water. Usually, there is a third basin below this from where animals can drink or bathe. The run-off from the dhara is usually channeled into the fields.

This traditional system ensures that no living thing is deprived of water, albeit the quality deteriorates with every fall in level. Traditionally, people didn't use soap made from chemicals and there were no detergents – pollution therefore was not an issue. It has become a problem now because of the processed soaps and detergents that are used.

Dharas by their nature provide space for the village community to meet and interact. They are an open construct where people come to the water and use it according to their convenience. Water is plentiful and clean in some parts of Garhwal and still fit to drink as it emerges from the hillside. They are made of local material by local artisans usually at the behest of the local wealthy.

The dhara at Tungnath is a small affair – no water flows into it now. The spouts remain as empty mouth in the hillside. The enclosure has become a slimy cesspool, even though people haven't yet start throwing garbage in it. Once, it was used to bathe and wash clothes. Now, its an abandoned little shed.

"In the 1999 Chamoli earthquake, the source of the water shifted to where it is now, a few yards from the originally dhara. The flow also decreased," says Ramesh.

We wend our way down the 3 KM path from Tungnath to Chopta, the place on the Kedarnath-Badrinath route where I've parked. The path is about a metre wide and paved strangely enough, with stones placed vertically. This makes walking extremely

difficult and despite my thick sandals, the stones seem to poke through the soles. It's a tedious walk at the best of times, and pursued as we are by a storm and high winds, the walk becomes a ordeal. We duck into a rough shelter, made of a pile of stones, by the side of the path. It's the same construct responsible for the deaths of many during the earthquake – the loosely piled stone walls collapsed and the heavy stones that make the roof crushed people inside. The open shelter gives little protection from the biting cold wind, coming at us straight off the snowy hills a little distant.

Soon, the storm blows itself out. We take the path again and trundle down. On the hill side are small flower and short grass. On the valley side, rhododendron bushes adorned with pink, purple and white flowers stretch down the Himalayan meadow to the treeline a few hundred feet below. The trees turn the hillside a darker shade of green and make a continuous carpet up the next hill. Beyond a range rise the snowcapped peaks. It's a continuous panorama. Next to the path, at 500 M intervals, are taps that drip a steady stream of water. All of them have a jerrycan or some such container, left by an owner to collect water over the hours.

We pull up at a small tea stall clinging to a pile of rocks on the hillside, one of half-dozen en route Tungnath. These open seasonally and are run by local villagers. This sample has a floor of wooden planks, walls of jute bags and a roof of tin. The wind blows freely through, making tea boiling difficult. We sit on the path's wall opposite the stall while Rahul makes the tea. He gives us water also, extremely generously. He is one of the owners of the jerrycans we saw further up. He leaves one there at night to fill and brings it down to his stall in the morning, replacing it with another to fill during the day. This way, he gathers his 80 litres of water.

"What are your problems here," I ask.

Rahul says "I don't mind the hardship of sleeping on the hillside in my shack. Nor the loneliness. Nor the lack of customers. Water is the biggest problem. You can see how difficult it is to bring a full jerrycan downhill but we have to do it."

A little below the tea stall the path enters the treeline and the forests give a welcome break from the sun, that has shone through and is painfully bright, hot even. The walk downhill is harder than the horse ride uphill even though the horses often teetered on the edge of the path; many times I was staring down the horse's flanks at the steep fall to the treeline far below.

From Chopta to Gopeshwar, the road passes through the dense forests where the Chipko andolan began over three decades ago. Traditionally, people could cut dead wood and use other minor forest produce. They were allowed wood for house building and cooking. But then, the government decided to deny them access to forests, giving contractors the award to cut down and take away trees. Angered, the villagers blocked roads and did not let contractors drive their trucks into the forests. There were skirmishes and a law-and-order problem.

The women then decided that the best way to get what they wanted – stop the contractors – was to hug the trees and force the contractors wood cutters to retreat. Their life before the trees', so to speak. This strategy worked and was actively propagated by the local Sarvodaya activists among other villagers. The movement met

with spectacular success and has become a model for anti-logging activists around the world.

Its dense forest, as it has existed for millions of years, unlike the plantation forests in so many other parts of Uttranchal, where indigenous trees have been cut down and replaced by fast growing varieties, more suited to the timber industry. The oak is one such indigenous tree that has been decimated in large parts of the state. Its leaves are used for goat feed, dead branches for firewood and wood for furniture. Its spreading roots and branches are particularly good at stabilizing the slopes of the fragile hills. Despite its usefulness to local people, the oak has been systematically cut and replaced by commercial species of pine. It was this that the Chipko movement prevented. The dense forest that I drive through between Gopeshwar and Chopta is part of the area afforded protection after the movement.

It's a single lane road, so if I encounter any oncoming traffic, one of us has to find a shoulder and pull over, or back up. Thankfully, I encounter a couple of buses and a few jeeps on the three hour drive. The views of the snow covered hills are breathtaking, peeping through the dense foliage. The narrow winding road emerges from the forests a little above Gopeshwar and then we are into the town.

"This place has been undisturbed for millennia. It's a large area, some 1,300 square KM, that we managed to protect during the Chipko movement," says Ramesh. He was one of the early activists and helped mobilize people from villages around to hug trees.

Gopeshwar is a small town halfway between Kedarnath and Badrinath. There are maybe 15,000 people, and it's the largest town in the region. The most respectable place to stay is a hotel run by the Garhwal Mandal Vikas Nigam and at Rs. 200 a night, it is eminently affordable. For that princely sum, you get hot water on call, a smallish room with an attached bath and a dining hall where the basic veggie-daal-rice or roti routine is available. Don't expect any fancy non-vegetarian fare – I got chicken one day with some difficulty, and then it wasn't very edible. Its noisy, because the main parking lot for the town is right in front. Visitors to the town cannot drive into the main market. From 5 AM onwards, people doing the Dham circuit from the plains in their minivans start to leave, having spent the night somewhere in town. There is a cacophony of sounds – horns, diesel engines starting up, shouting and yelling.

The entry to the market is right outside the hotel, under an archway with the words Welcome to Gopeshwar Municipal Corporation written on it. To one side is a garbage dump and on the other are rickety shops. The market itself is nothing to write home about – a line of shops selling cheap plastic stuff, clothes and assorted items for daily use. The Sarvodaya office is half way down, up a few steps in an old but serviceable building. Its quite bare, save for publicity material and books and inhabited by men of great vintage. Ramesh runs a little printing press in town where he turns out calendars, greeting cards, visiting cards and the like in addition to his own newsletter. This and his writing gives him enough to get by. The printing press has a couple of machines but is small – the air is heavy with the acrid smell of printing ink and thinning fluid.

At the far end of town, the road ends in a small square, on one side of which is the Gopeshwar temple. Its again of great antiquity, like those at the five Dhams. Gopeshwar is the summer retreat of the deities from Rudranath and Gopinath – for the six winter months, the idols from these two temples are kept and worshipped at Gopeshwar. Its similar to the Tungnath temple save that its set in a town, not against hills. I enter the temple through a high portal, then a passage leads me directly to the sanctum sanctorum. Myriad candles illuminate the deities. Walking around the courtyard, I see old stone sculptures and an ancient tree, growing atop the ruins of a what was a small stone temple. Ramesh's house is across the wall from the temple. He tells me the temple is rumoured to be 1,500 years old, which probably applies to the small stone temple in the courtyard. Adi Sankaracharya had visited these five dhams and their wintering places in the 6th or 7th century AD, so all the places of worship probably date at least from there.

Ramesh joins me when I leave the temple. We walk to the end of the road, where the Gopeshwar dhara is. A large board proclaims Vaitarni/Rait kund – the dhara of the temple. Steep steps lead to the dhara. Its well kept with a marble platform around it and a covering of wire mesh screens. Beyond lies a hill and the road to Chopta. The dhara is a square, about 20 feet to a side. The top level is made of marble and water pours of one of three spouts.

"The dhara is still the main source of drinking water for people in town, inspite of piped water supply," says a man, noting my interest. He bends for a drink, cupping his hands under the flow to direct water into his mouth. I follow him into the dhara – the water is cool and sweet, filtered in the bowels of the earth.

"It's better than the tap water here," says Ramesh.

The priests of Gopeshwar's temple are the only ones allowed to bathe in the dhara. The water from this section flows into a large concrete pool a few feet below the dhara where a bunch of boys from town are having their evening bath in the setting sun. In contrast to the water in the dhara, that is clear, the water in this concrete tub is murky with soap. The soapy water flows into a drain from where animals drink.

Ramesh shakes his head. "The soap pollutes the water and the animals get sick. This is the problem with partial traditions."

On the way up, we pass a group of small shrines of great antiquity, small carved rocks in the shape of temples. The dhara is actually a part of the Gopeshwar temple, not these shrines. Once, they were part of the same complex; now they are separated by a few metres of housing.

Ramesh explains the link. "A temple is not said to be complete until its water source has been built. You will always find a dhara or other source of water next to a temple in Uttranchal. It works the other way around also – where there is a water source, there is a place of worship. This keeps people from defecating around water and polluting it."

Garhwal had hundreds of dharas once, all in good repair. These were built by the local rulers or the wealthy to benefit everybody. Since the 1960s, they have slowly gone out

of fashion and now, there are only a few still in use. It isn't as it the others have collapsed or don't have water any more; people have piped water supply and find it tedious to go to a dhara to collect water. It does not matter that their piped supply is irregular and sometimes dirty. Water in the house is worth much more than water in a dhara.

Seems the logic works the length and breadth of India. In Shekhawati, each of the tankas had a cubby hole with an idol. In Chambal, most tanks had a small temple on one side. In south India, nearly all temples have a large water tank, or eri, inside their complex. And eris have a shrine on their banks. The link between water and religion is deep and as complex as the people who live in India.

An enormous deodhar stands watch next to the dhara's signpost, another monument to the past, when these trees and the majestic oak rules the forests.

In the neighbouring region of Kumaon, similar structures are called naulahs, with one basic difference. Naulahs are not necessarily filled through spouts but also from underground streams. Their water is also used for drinking, washing and bathing. Most naulahs are made of stone and if the builder fancied, he would make it in the shape of an animal – elephant, cow, buffalo….

Ramesh says, "Almora in Kumaon used to be known for its naulahs. When it was founded by the Chand rajas in 1563, naulahs were the main source of water. This continued even when the British made it the capital of Kumaon in 1815. There were so many of them that the town was never short of water. Most localities in town are still named after old naulahs."

Kumaon, with a share of one-third of Uttranchal's water, has a crisis each summer driven in part by the tourists from the plains and the hotel industry. It has relied on these traditional structures in the past but now, tankers have taken over. People have become more dependent on tankers since they got tap water; trekking uphill and down-dale for water is simply not their cup of tea anymore.

People use large and small rivers in Uttranchal for drinking, bathing, washing, etc., and also for energy. Fast-flowing water channeled into what is now called run-of-the-river schemes to turn grinding mills and dynamos. The traditional water mills are called gharats.

"I've estimated there are half a million gharats in the Himalayas," says Ramesh. These aren't all in Uttranchal but spread across the entire Himalayan range. For centuries, gharats have been an important focal point for hill village communities. Traditional gharats were built collectively by everybody in the village, each contributing his or her own expertise. They used local material and craftsmanship to make the mill that was the place for social intercourse, in addition to milling wheat and maize.

The traditional gharats are built in a small valley where a fast-flowing stream can drive a water wheel. Traditional gharats have two types of water wheels. One is a circular assembly with wooden vanes stuck vertically onto a wooden wheel with a hole in the center. This is mounted horizontally, not vertically, on a wooden rod and

immersed in the water – it spins with the force of water. The other kind has a massive central wooden hub into which wooden vanes are hammered at an angle of 45 degrees to the vertical; this maximizes the impact of water. In both cases, water is channeled onto the vanes.

The hut with the grinding stones is built on a small bridge across the stream so the stream's entire force is channeled onto the water wheel under the hut through a hollowed tree trunk; this concentrates the force of water. The rod attached to the water wheel turns one of the two grinding wheels in the hut above. Wheat or maize is poured into a basket-shaped hopper, from where it goes into the hole in the upper wheel. The flour is collected on a jute bag spread under the wheel. The hut itself is a typical stone-mud-thatch affair, cheap to make and repair. During the monsoons, gharats sometimes get washed away and the community bands together to rebuild it. The use of local material keeps costs down.

The wood for the water wheel and connecting rod is local, from a hardwood tree. The stones used for grinding are locally sourced and shaped. A carpenter makes the water wheel and connecting rod. A local artisan makes the hut and assembles the gharat. Water from the stream is channeled onto the water wheel through a pipe made from a hollowed tree trunk, again available locally. With local labour, a village can assemble its own gharat at nominal cost.

The gharat operator or gharati gets 1/16 of the quantity of wheat ground as payment, seldom in cash, that he estimates and keeps. This is not enough for a family to live on anymore. A traditional gharat, with a wooden water wheel and connecting rod, can grind up to 60 KG of wheat and about 50 KG of maize on an average day; the gharati gets about 4 KG of wheat and 3 KG of maize, that are worth around Rs. 100 on the market. For a five-member family, that is simply not enough. Compounding their problems is the spread of diesel and electric millers in nearby town of Uttranchal that can grind up to 400 KG of wheat a day. They make nearly seven times what a traditional gharati does, even though their running costs are higher. Diesel and electric flour mills have been recognized as a small-scale industry in Uttranchal, and so get concessions from the government. The state government granted gharats the status of a cottage industry in 1987-88, that allows owners to get loans and other help from the government.

Srinand Prasad Matiyal, is a gharat owner in the Gadora village, about 25 KM from Chopta, near Pipalkoti. His enterprise is hidden from the road by a thicket. Ramesh, Aryaman and I walk down the path, round a bend that is flooded with water from a stream and abruptly come upon Srinand's gharat. The road of running water, muted from the road, becomes louder as we approach his building. The place appears deserted.

Srinand emerges, in a blue kurta and white pyjama.

"This is Nitya, from Delhi. He is researching water traditions in the Himalayas. I thought his work would be incomplete without a visit to your gharat," says Ramesh, by way of introduction.

Aryaman has run off to the gharat hut. I greet Srinand and walk to the hut, eager to see this age-old contraption in operation. There are two buildings, one traditional – stones and thatch – and the other modern – concrete and corrugated iron. The gharat is in the traditional one, a dynamo and risk husking attachment in the new one. The gharat works, the other equipment does not.

The gharat's hut abuts the hillside. Water from the stream 5 M above is diverted into an aluminum pipe that channels it onto the water wheel below the hut. The wheel, spinning at about 150 revolutions a minute, turns the grinding apparatus located in a corner of the hut. Wheat or maize is fed into the upper wheel through a metal hopper and the flour collected in a woven plastic sack. Srinand estimates and keeps his payment, and there is seldom any dispute over it.

"We keep every 16th handful of flour for ourselves," he explains.

There is a weighing balance also, dangling from a beam in the roof with the 10 and 15 KG weighing stones scattered around. The air inside the hut is heavy with flour dust that covers everything, even the two women who have been crushing grain there for ah past 20 minutes. They have tied their sarees around their mouth and nose to keep the powder out. I take off my sandals and enter but beat a hasty retreat after taking photographs. The wheels produce an unpleasant grating sound that reminds me of fingernails being dragged across a blackboard.

I peer over the edge of the concrete slab. The water rushes out, having expended its energy on spinning the stones. It flows more sedately through a channel into the valley below. The original path of the stream, off to my left, is nearly empty as all the water is being used at the moment to run the gharat. across the channel, the small valley is green and tranquil. I can the bridge we has crossed on the road to get to Srinand's gharat; beyond that the valley continues uphill.

"Be careful. I'll ask him to turn off the water so you can see the water wheel," says Ramesh.

A few seconds later the water stops rushing from under the hut. The level of the stream rises. I gingerly cross the channel and squat, peering under the hut to see the wheel.

It's a wheel made of cast iron, one of the improved gharats that were developed by Prof R P Saini or the Indian Institute of Technology in Roorkee. A water wheel made of cast iron that does not rust, ball bearings to reduce friction and a steel connecting rod were the improvements he devised in the gharat under a government programme to improve gharats. The steel connecting rod is sunk in a concrete slab below the hut where it rotates on ball bearings. The shaft goes through the floor of the hut into the grinding room through another set of ball bearings. The grinding stones are better milled.

The improved gharat costs Rs. 15,000, quite steep for a local person. It also costs a lot more to maintain than a traditional gharat. For example, ball bearings cost Rs. 400 each; once a set wears out, it has to be replaced immediately, else the gharat cannot function.

“The owner has to go to Saharanpur to get these. That is a two-day journey by bus. It’s the same with the water wheel that is made in a foundry there,” says Ramesh.

“It took me over a year to recover the cost and pay off the loan,” says Srinand. “The power mills are the main problem now. They make at least two times what I do every day even after paying for diesel and power. Still, my gharat has a lower running cost.”

He would not even think of reverting to the traditional gharat. But then, Srinand is a privileged one.

“What is this equipment in the other building,” I ask him.

“That is a dynamo,” he says, pointing to a motor-like instrument. “And that a rice dehusker.” This is a large metal contraption with a hopper on top and a spout on one side. Both look as if they haven’t been used for a while. A large wheel on supports with a shaft running through the wall used to drive either piece of equipment. Water channelised from the stream above to a turbine outside the building drove the wheel, to which either equipment was connected by belts.

Ramesh explains. “The dynamo isn’t used because Srinand cannot legally sell power. He can generate it for his own use but cannot distribute it. The dynamo produces 5 KW, that is too much for him to use up. There is no distribution mechanism here. The state government has not allowed gharatis to sell power.”

The rice dehusker is used seasonally and nets Srinand additional income. His bread and butter come from the maize and wheat crushing operations. Srinand, Ramesh estimates, makes about Rs. 250 a day from this work. Its not a huge amount but enough to keep him and his family in clover.

Srinand’s son Jayanti Prasad is the treasurer of the Water Millers Association of Chamoli, that helps members get loans and spare parts for gharats. It also ensures that non-association members are denied access to money for the improved gharats in order to protect its own interests. Even at the micro-level, money dictates politics.

A little further down, I see this in action. There are three other gharats downstream of Srinand’s but he gets the most business because he is the closest to the road. The others have to be content with the overflow, which is also substantial enough to keep them in business. The last of the gharats is a traditional one, made of wood.

The owner of the second gharat complains, “The pin that joins the axles has got worn out so I have to run my gharat at a slower speed. I cannot crush as much grain. I have asked the Water Millers Association for the pin but they keep saying the part is not in stock. The real reason is that if my gharat runs to capacity, it will affect Srinand’s business.”

And the traditional gharati, who aspires for an improved version, has been denied a loan and equipment. The unspoken reason is unwanted competition for Srinand.

This last gharati, Diwan, has a ramshackle hut in the shade of an acacia tree. The stream gurgles down to a point about 3 M above his hut from where a hollowed tree trunk channels it to below his hut. The familiar roar of the water sounds from the bowels of the hut and the stream emerges below, flowing sedately. I peer into his hut, that doubles as his dwelling, unlike Srinand's that is only used for the gharat.

It's a poor man's quarters. There is a basket hanging from the ceiling, lined with clothes, that is the crib for the man's child. In a far corner, with a window for light, sits his charpoy. In another corner is the hearth. The grinding stones are in the opposite corner, near the door of the hut, in a small depression in the floor. The difference in appearance is palpable. So is the difference in the speed of the gharat – this one's stones rotate far more slowly than Srinand's, or even those of the person immediately upstream.

Diwan says, "I've asked the Association every season for an improved gharat. They have refused, saying there are already three here so there is no need for a fourth."

"Why don't you go somewhere else?" I ask.

"This is my village also. Why should I go anywhere else?" he retorts. "Let them go somewhere else." He waves upstream.

Diwan barely manages to make ends meet. He supplements his income by working as a daily wage labourer in Chopta and other towns.

"There simply isn't enough work for all these gharats any more," says Ramesh. "The population of Uttranchal isn't large enough to support them, what with power mills and packaged flour. They cannot sell electricity and rice husking is seasonal. Cotton ginning has not caught on because readymade clothes are easily available. Still, the government has done the right thing in giving them the status of a cottage industry."

Gharats can multitask, unlike power mills. They can crush more than wheat and maize – Ramesh extends their utility to powdering spices and oil extraction in addition to what's already been tried.

"The gharat flour tastes better than mill flour," he says. True, flour from a small mill tastes better than flour out of a plastic bag. Maybe its because of the gharat's slow grinding speed, that preserves flavour and nutrition better than the mills.

All these make gharats suitable for local industries in the hills where accessibility and cost matter. The question remains – how cost-effective are they given mass-produced goods. The further I go into the Himalayas, the costlier these things get. But I don't seek people weaving their own clothes from cotton ginned and spun in their own villages. Sure, there are a few who produce traditional handloom cloth but these aren't enough to support many gharats. And most gharats aren't equipped to process cotton.

What would help gharat owners is if the government allows them to sell electric power in their neighbouring villages. At 5 KW each, gharats can light up several homes. They need a power distribution network that can be provided fairly cheaply at the village level – there is no need for a major power grid but a small local grid that

connects gharat-based dynamos to houses in nearby villages. Given the unreliable power situation, this would definitely help matters in Himalayan villages. It would also go some way in making gharats a remunerative proposition in this day and age.

“Uttranchal is dotted with failed power projects based on gharats,” says Ramesh, on our way back to Gopeshwar. “Since 1975, the government has tried various schemes to generate power from gharats in a viable manner. None has succeeded for a variety of reasons.”

The return on investments is small, based on the low firm power output of a gharat. There is a question mark over distribution and pricing of power. Then there are legal issues that have never been tackled. Added to this are the state electricity board people who make money providing connections, raising the capacity of existing connections and repairing faults. The final one – locally trained technicians for repairing faults – is surmountable provided there is a demand for the power.

The future of gharaats doesn’t look very bright. However, there are many organizations in the region that haven’t given up. If we assume that each gharaat can generate just 3 KW of firm power, and there are 250,000 in the Indian Himalayas, then they can generate a combined 750,000 KW of power. This can power at least as many households across the mountains. More than the quantity, it’s the location that makes this power attractive. It would be generated at the village level where power supply is either non-existent or erratic, and distributed right there.

The beauty of gharaats, I saw, was that you could string many of them along a single small stream and all of them could run, each supporting a family. The operation of one gharaat does not interfere with that of the rest. Most gharaatis are from the lower castes and poor. They are averse to taking risks, preferring instead to let things run as before. If the gharaats are to get a better deal, their operators will have to be uplifted first by training in both technical and entrepreneurial skills. At the moment, if the gharaat does not help them to make ends meet, they seek manual work elsewhere.

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A jacaranda tree is in full bloom in the hot afternoon. It doesn’t feel like the Himalayas at all – more like a suburb of Delhi. If it wasn’t for the mountains and the pine trees, I’d think I was in the Aravallis on a hot day. A loud double thumb reverberates in the valley as I get out of the car. We near the bottom of a picturesque, forested valley in between Chopta and Pipalkoti. On one side is a semi-finished house, on the other the forested hillside. We had passed the Gadora village a kilometre back. It’s a typical Uttranchal village, huts made of stone and adobe with either tin or stone roofs and some concrete houses. The mandatory ISD/STD booths that seem to be the main occupation of all people in the village – they must do good business because mobile phones do not work in the hills and this is the route to Badrinath. Its yatra time and the road is full of Tata Sumos and Toyota Qualises trying to push one another into the Alaknanda roaring by a few hundred metres below.

Narender Kumar emerges from the semi-finished looking house. Actually, its finished but rods and other construction material lying around gives me the impression that he left off half-way. At road-level, there is a small shop where he sells squashes and jams

made in his house at the level below. The shelves are crammed with plastic jerrycans of squash and large plastic jars of jam. His squashes are of rhododendron or amla and jams of apple and amla. Ramesh does the introductions. To the left of the shop is the roof of his house and steps leading down to the courtyard. From there, a path leads into the fruit orchard in the valley below.

“Have a drink,” says Narender. “Then we will go and see the hidrum.”

“What’s a hidrum?” asks Aryaman.

“You will see. Can you hear it?” says Ramesh.

The steady thumping from the valley seems to be more muted inside the shop and all the harder to hear what with the traffic on the road. We finish our drinks, lukewarm in the warmth of the afternoon, and emerge onto the roof. The stairs have no railing so we hug the wall going down. From the courtyard, Narender leads to the path into the valley. Its wide at the top but quickly disappears into the fields just below his house. We pick our way over newly-ploughed earth to the far side of the first terrace. At the end, there is a narrow cement canal, about 6 inches wide and twice as deep. Its half-full with rapidly-flowing water; water that the hidrum has pumped to a tank near this house from where its released into the fields through this canal.

The path and canal run together from here. Its easier to walk on top of the canal even though its steep in places.

Ramesh tell me the history of hidrums as we walk down. “Hidrums were introduced in India in the 1960s. Two non-government organizations modified the European design to suit India and started getting them manufactured here. There are now thousands of these thumpers in the valleys of Himachal Pradesh and Uttranchal.

“In a village in Himachal, the government installed hidrums to irrigate 75 bighas of land (about 5 bighas make an acre) at a cost of Rs. 76,000. In a year, the people managed to grow 2.5 times more wheat then they used to. Each family earned an additional Rs. 10,000 annually from vegetables.”

He turns to Narender. “I’ve seen so many hidrums in the hills. Very few work properly. You are lucky. What is the record of these hidrums?”

“Quite good,” says Narender. “They broke down a few days ago but the irrigation department engineer came and fixed it. I was surprised by their prompt response.”

Seems like it’s not the norm for irrigation department engineers to respond promptly to complaints from people. Ramesh confirms this to me later. Sometimes, they can take a month to act. Larger farmers, and even groups of smaller ones have got together, to build their own maintenance systems for hidrums.

Hidrums are simple devices, developed around 200 years ago in Europe for pumping water. When cheap electricity became available there, their popularity declined. They are ideal for remote hill areas in Uttranchal where power and diesel are both in short supply or expensive. Essentially, they use the force of flowing water to pump it to a

height. Ideally, the ratio of the head of input water to the height that it is pumped is 1:8, that is to say, if the water is channeled to the hidrum from a height of 5 M, it can pump this to a height of 40 M. But we don't live in an ideal world and the usual ratio achieved is more like 1:4. This ratio is called the lift magnification. The height to which water can be pumped is inversely proportional to the quantity of water pumped.

We reach the bottom of the valley after 15 minutes' clambering down the cultivated hillside. Its overgrown and a fast-flowing stream runs along it. The going gets tough here but the thump-thump of the hidrum beckons us. It's really loud and the sound reverberates off the valley walls. There, in a clearing, is the contraption.

It comprises two large steel cylinders, each around 5 feet high, standing in a square concrete enclosure. Their lower portion is submerged in water. The cylinders are fixed to a steel water chamber, also submerged in water. Water from a concrete supply tank, about 10 M above, rushes into the water chamber through a supply pipe. At intervals of about 3 seconds, the hidrums go thump, the water boils around the cylinders and a delivery pipe connected to the cylinders takes the water to the storage tank near Narender's house. It all seems very disorganized and not at all like a system that can pump water anywhere. The enclosure's walls have cracks and threaten to collapse at any time. The cylinders are rusty. I wonder how long they have been down there.

"Since around 1981," says Narender. "But they actually started working much later, in 1995. The irrigation department put up the hidrum but didn't make the channels for us to use the pumped water."

The steel tank under the cylinder has two valves. One is where the cylinder connects to the tank called the delivery valve. The other is an impulse valve that lets water flow through into the concrete enclosure of the hidrum.

The water flowing into the steel tank forces the impulse valve closed. It rapidly fills the tank – once water pressure in the steel tank reaches a critical point, it forces the delivery valve to open with a loud thump, that I hear every few seconds. Water rushes into the vertical cylinder. The pressure in the cylinder and the steel tank equalizes and the delivery valve closes; the impulse valve opens. In the meantime, the water in the cylinder has been forced up the delivery pipe to storage tank up the hillside. The process repeats itself and with every cycle, more water is forced up the hillside till it flows continuously to the storage tank. Only a small part of the water that enters the water chamber is actually pumped uphill.

The rate at which the valves open and close determines the quantity of water pumped. This can be easily adjusted by hand; the typical frequency for small pumps is 70 – 90 times a minute. The higher the frequency, the faster the rubber linings wear out. Hidrums come in five different sizes: 1.25" X 0.5", 2" X 1", 4" X 2", 6" X 3" and 8" X 4". These are the ratios between the supply and delivery pipes.

Both the valves have a rubber lining that wears out in a few months because once started, hidrums run continuously. The don't need any electricity or manual intervention to run. They pump water all the time, filling the storage tank and irrigating fields. When the rubber lining wears out, the pump's efficiency drops. This is when the farmers call the irrigation department to repair the hidrum. Given its

mechanical simplicity, maintenance is relatively simple and can even be done by a local person, provided he has the tools.

To repair it, the engineer stops the hidrum. There is a pedal at the base of the vertical cylinder that stops the delivery valve from opening. He presses this for a short while and the thumping stops. He puts a piece of wood into the impulse valve to keep that open and let water flow downstream. To change the delivery valve's rubber, the engineer removes a panel on the side of the vertical cylinder, takes out the valve and replaces the rubber lining. The impulse valve is simpler to repair. Repair completed, he kicks the pedal a few times to get the hidrum going again. The entire process of changing the rubber lining for both valves can take a couple of hours.

Hidrums have to be necessarily located on the floor of the valley. Access is difficult and they can also be damaged during the monsoons, when streams turn into raging torrents.

The smallest hidrums lift about 4,000 litres of water to a height of 30 M while the largest can pump over 100,000 in 24 hours. This means that a large hidrum can irrigate just over an acre of land that is 30 M above but a small one can do just about $1/20^{th}$. Smaller hidrums are good for pumping water for human consumption or for watering nurseries. Both, however, are useful for irrigating the slopes of hillsides where water is otherwise to find.

Narender has two 6X3 hidrums going 24 hours. He gets around 90,000 litres a day, more than enough for irrigation and his family's needs. However, the excess water flows back down the valley and is used by another set of hidrums further down the valley. He pays nothing. The only other source of water is a pipe that runs along the road and supplies drinking water once a day – its just not enough for other use. It the hidrums weren't there, Narender's orchard, and business, would not exist.

Of course, Narender could have installed an electric of diesel pumpset. Both would cost money to run and would be more expensive to repair. He would have to retrieve them before the monsoons because if they were to be washed away, he would not get any compensation from the government. The hidrums, on the other hand, were installed by the irrigation department, which also looks after them. They are sturdy enough to withstand a fair degree of flooding – even if inundated with water, they don't get damaged.

Hidrums haven't been as successful in Uttranchal as they could have been. One reason is that the irrigation department, while selecting places to install them, looks only at technical aspects – the quantity of water available, height to which it is to be pumped and therefore the size of hidrum needed, and ease of installation. It doesn't look at the actual water needs and the pattern of land ownership. Very often, many farmers have small plots on the same hillside, causing water-sharing problems. The farmers near the storage tank get more water than those further down – an unusual situation. To keep the peace, they sometimes decide not to use the water at all and the hidrums installed never get used. In other cases, the department puts in the hidrums but not the water distribution network of canals. In most cases, hidrums are simply not repaired when the valve rubber linings wear out. In some villages, there isn't enough farm land that needs to be irrigated so the villagers don't use the hidrums. The

department assigns a chowkidar and a mechanic to each village to look after all the hidrums in the area.

“The irrigation department has to meet certain targets. They install hidrums even where people cannot use them,” says Narender.

Hidrums do better in places where a single person owns all the land on the hillside and where a local mechanic is available. They cost less than Rs. 100,000 to install, including the cost of water supply channels, and only about Rs. 1200 a year to maintain. A diesel or electric pump of comparable capacity is priced about the same to install but more than 100 times costlier to run – an estimated Rs. 130,000 or so.

It would make sense if the villagers are assisted in installing hidrums where needed, rather than the current top-down approach of the irrigation department. Were this to happen, villagers could decide where to install hidrums and what size would be ideal. They would also sort out water-sharing concerns better than the government can do. In fact, this issue needs to be addressed before any plans are drawn up because it frequently leads to conflict in the village. Another way to ensure that villagers use the water, and take care of the hidrum, is to involve them in building the supply and irrigation channels as well as train one of them to look after the device.

The irrigation department, on their part, says villagers aren’t ready to use the facilities they are offered. This sounds like the typical bureaucratic refrain – we give the natives everything but they are too ignorant to use them. Instead, a partnership would go a long way in making sure simple, cheap irrigation methods get widely adopted.

Uttranchal, the cradle of the large rivers of the sub-continent, has a problem of plenty. There is plenty of water in Garhwal, but a shortage in Kumaon. All Kumaon’s towns are parched in summer. Garhwal’s towns have a water shortage when the deluge of tourists from the plains ascends to them in summer.

On one hand, there is a shortage. On the other, there is a crisis of quality. For the past 200 years, Uttranchal’s hills have been systematically logged. First by the British to get timber for the Imperial navy and the railway network. Later by the Indian forest department to make money. And still later by timber contractors, protected by the politicians of the plains. Native forests were cleared and replanted with commercially useful species such as pine. In the process, the fragile hills lost their ability to hold, and gradually release, the deluge of monsoon rain that they receive in a few months of the year.

“Kathgodam was the main place in the hills where timber was processed. It means a timber godown. The town developed because of the saw mills set up there to cut the trees. I remember as a child watching the entire river choked with cut trees. The loggers would clear part of a slope and roll the logs down to the river. They would float down to Kathgodam. During the couple of months that they took to reach there, the wood would get nicely seasoned,” says Ramesh.

I look down the slopes to the river. It’s wide and fast. It’s hard to imagine the hills could produce so much timber and yet have any left.

The population has also increased and growing towns and villages, none with any sewage treatment systems whatsoever, pollute the rivers. Driving along the Alaknanda river, from Rishikesh to Chamoli, a distance of about 250 KM, I notice the river gets clearer as I move into the hills. I break journey at Srinagar in deference to Aryaman, who is car-sick and quite road weary.

A sign on the highway beckons me to the Ivy Top Resorts hotel. It's a steep climb up an unpaved road to Pine Top hotel. The hotel is at the top of a small hillock. Its run by Mr B N Ghildyal, whose father bought the land while in the Indian army back in the 1940s. He has an amazing variety of fruit trees, some which are in bloom and there are raw fruits on the others. He's made the main house into a hotel and charges Rs. 1000 a night, exclusive of food. It's well worth it, because the view of the Alaknanda upstream and downstream is great. In the evening, I sat on the lawn with a beer contemplating the river coming downhill. In the morning, I sipped tea on a porch – he's making a restaurant behind the hotel – gazing at the river wending its way down to its confluence with the Bhagirathi river. You can drive from Rishikesh to Gopeshwar in a day, but it's a long drive and Pine Top hotel makes for a pleasant interlude.

In the hills, there is a strict driving code. All hill driver follow this irrespective of what they are driving. Its best to get acquainted with it – though none of them will tell you, you can guess it. If you are on the valley side of the road going up, you have absolute right of way. If you are on the hill side of the road going up, you get right of way only over small vehicles; you need to make way for trucks and buses to pass. This is the same if you are on the valley side going down. If you are on the hill side of the road going down, you have to let everything pass. There is a trump card in all of this – turn on your indicator to signal you are turning right: this tells oncoming traffic to get the fuck out of your way! Hill drivers are cool, and usually let you pass if you slow down and move out of their way.

Lunch was at a small dhaba outside Pauri, full of taxi drivers.

One said, "An Indica rolled off the hill this morning."

"You mean so-and-so's car. It was new," said another.

The first one grunted. "New car. Didn't know how to drive."

Not encouraging conversation. The lunch is better. A fixed thali of local fat rice, chapattis, a vegetable and daal for Rs. 20. We quickly eat our food and get on our way – I am keen to leave the dhaba and its scintillating conversation as fast as possible. It a lovely winding and fairly deserted road thereafter to Lansdowne.

Lansdowne in Kumaon typifies the hills, with its problems. It's a pretty cantonment town at a decent height, so it's cool even in the day. But there is no water. The town is entirely supplied by tanker, operated by individuals and the army. Rather odd, I think, for a town that is also the headquarters for the prestigious Garhwal Rifles regiment of the army. I see people queueing up at the few handpumps in town; they can fill one pot and then have to wait a few minutes for the pump to recharge before filling the next. People use funnels made of plastic bottle halves so that no water is wasted.

Strange that a hill town should have no water source. Maybe its founders the British weren't big on baths.

At the GMVN hotel, that has nice cottages for Rs. 1000 a night including breakfast and morning tea, I am told by the manager that water will come by 5 PM. We check in at 3 PM after a longish drive from Gopehwar, via Srinagar. The road branches off the highway there and heads over the hills from Garhwal into Kumaon. We badly need to bathe but there is absolutely no water, save the small jug of drinking water. I content myself with a wet tissue instead. Uttranchal as a whole does not seem to have a water crisis yet, given the plethora of rivers. But climate change is slowly changing that. Glaciers are retreating at a faster rate. They, and the myriad streams that ooze all year round from the rocky hills, feed India's major rivers. Melting glaciers are good news in the very short term – there will be more water for all. But once the glaciers are gone – climatologists predict they will be in another 50 years, - most of the rivers will dry up too.

Deforestation has reduced the amount of rainfall in the hills, both in terms of the total quantity received and the number of rainy days in the monsoons. This is having an immediate impact on the whole of north India. Power and water shortages have become more acute in summer. Most of the hydro-electric dams do not have enough water to generate power that will meet the every-increasing demand, both from rural and urban areas. The extremely controversial Tehri dam still has not filled, and cannot provide water to Delhi as was promised, nor generate any electricity. The mountains are so fragile that landslides are common and the rocks absorb a lot of the water that the dam is meant to store. It may still work, provided it does not trigger an earthquake – Tehri dam sits right on top of a major tectonic fault. Protecting forests and allowing them to regenerate is a logical solution.

After it became a state, Uttranchal was spared somewhat from being Uttar Pradesh's politicians' playground. However, its own population is growing fast, straining natural resources. The near-total lack of sewage disposal facilities means that most of the rivers are already quite polluted when they reach the plains. Both the Ganges and the Yamuna are notorious world-wide for being extremely polluted rivers. The only saving grace, if I can call it that, is the absence of polluting industries in most of the state.

The government conjures up ever-grander schemes to 'solve' the drinking water problems of the population. For example, it lays a 50 KM pipeline to take water from a river high in the hills to Pauri at an astronomical cost. Of course, the pipeline develops leaks or breaks with predictable regularity. So the people who depend on it are left, literally, high and dry. Tapped water never melds people together – it only divides society. Taps are intrusive – the water is thrust into your life. Traditional devices were inclusive – people went to them, they accommodated large numbers of people as they were designed to do and water provided a meeting point for lives.

This is fallout of forgetting one's traditions – the naulahs and the dharas – that kept people adequately supplied in ages past. One of the solutions in Uttranchal is to revive the hundreds of such water supply and harvesting structures.

Both the feeling of belonging to a cohesive community and quality of water has declined over the years. People lament water, its quality and quantity; you should have tasted the water then, they tell me, it was something else. This, this isn't what we called water. But they do nothing – the government, that distant father, will provide for their needs. Uttranchal's denizens are a resigned lot.

Uttranchal does have a crisis of intellect. The average person here, in the abode of the gods, is singularly disinterested in protecting his environment. There seemed to be even less of this than in other parts of India, Rajasthan for example. The people have no feeling for the rivers or forests here. This is the state's paradox – its problem of plenty.

Nitya Jacob

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