Construction of Calamities in the Uttarakhand Himalaya

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Hydropower projects on the Uttarakhand rivers have proven to aggravate the severity of floods, making them calamitous. In addition, these projects have also increased the vulnerability of the mountain villagers towards disasters, while giving these an unsettling everydayness and a spiralling effect. Projects have evaded accountability and responsibility for such disasters by opportunistically deeming these as *devi aapda*, or natural calamities, even as the line between natural and human-made calamities has become more blurred than ever.

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"Company gaya" or "the company is gone" are the anticipative cries one hears in the videos that the villagers settled at heights could take of the "toofan," the towering surge of sludgy waters proceeding through the gorges of the Rishi Ganga river towards the Rishi Ganga Power Project. It was obvious to the villagers that the surge would take down any kind of obstruction constructed in its path. After wiping out this project in seconds, the waters barrelling through Dhauli Ganga reached and swept away the barrage of the Tapovan Vishnugad project, about 8 kilometres (km) downstream, near Joshimath town in Chamoli district of Uttarakhand. The villagers did not wish that these companies, the hydropower projects, of which there are 450 in the Uttarakhand mountains, had come near their homes in the first place. They could apprehend and have experienced that the heavy blasting by use of explosives that the companies employ for construction, large-scale deforestation, and the muck they dump by the riverbanks prove to be disastrous.

When the coming of these projects, however, was forced down upon them, many had to give up their agricultural and forestlands and were made to feel obliged for getting temporary jobs of constructing the tunnels and barrages of these projects or for other small "favours." Their lives have got inevitably tied up with these projects despite their fear of and disagreement with such an intervention, projected as development. They have turned into labourers for constructions that have literally shaken the foundations of their homes and have forced many to leave behind their homes in search of work and secure habitation. It is these very projects which also became the cause of the workers being washed away or buried under the sludge on 7 February 2021. The flood caught them unawares, with only their fellow villagers calling and whistling to alert them of the waters rushing towards them.

Such floods, irrespective of the reasons behind them, and other such occurrences that involve the natural play of snow, ice, sun, river, rain, and topography of the Himalayan region, are bound to happen. Much remains beyond predictability and only in the domain of speculations. Uncertainty is increasing due to the climate crisis, resulting in receding glaciers, altered river flows, and increased incidence of glacial lake outburst floods. The disaster prevention and minimisation systems are found wanting more often than not. In such a scenario, hydropower projects in such regions where earthquakes, landslides, heavy monsoon rains, cloudbursts, avalanches, etc, are not uncommon,[1] should not get a go-ahead.

Quite unlike their appearance, the geography of these mountains-in-the-making is fragile, as is their ecology and geology. Hydropower projects come as an onslaught on these fragile conditions. They generate as well as amplify the intensity and viciousness of disasters, not just damaging the environment in the process, but also affecting the mountain people, who have shaped their lives over the years to try and attain a balance with their surroundings.

Exacerbating Disaster Potential

The Ravi Chopra Committee (2014) that was formed under the direction of the Supreme Court to study whether the hydropower projects exacerbated the floods of June 2013, had established such a connection between the dams and worsening of floods. The massive floods in 2013 had damaged more than 24 hydropower projects in various river valleys of Uttarakhand, which intensified the destructive impact of floods on the local villages and led to the deaths of thousands. Crucially, the committee had explained how the projects getting built in the paraglacial region, that is, at elevations above 2,200–2,500 metres, of which there are 76 projects of more than

3,100 megawatt (MW) capacity in Uttarakhand, are more dangerous.

The paraglacial zones are sediment hotspots that remain in a continuous process of adjusting to the changing environmental and climatic conditions, the committee report has explained. These are the zones that get formed after the receding of glaciers. In such zones, the rivers are capable of mobilising tremendous amounts of sediments from the morainic material left behind. In the situation of floods, the rivers then cause havoc in the vicinity of the hydropower projects, as was witnessed at Jaypee's Vishnuprayag project barrage site, near Joshimath, during the June 2013 disaster. Both the Rishi Ganga and National Thermal Power Corporation's (NTPC) Tapovan Vishnugad projects affected by the 2021 flood were also in the paraglacial region.

After both the floods, of 2013 and 2021, the governmental narratives around the dams focused on the damages caused to these and the way they contained the floods, rather than their damaging impacts on the local villagers and workers of the projects.[2] However, in both the calamities, it was clear that blockages in the path of such a surge and huge amounts of debris generated after the collapse of blockages compounded the severity of the flood. Rivers burst through with greater force after obstructions, preventing the flood from subsiding in the normal course after reaching wider riverbeds and gentler slopes. And it is not only one project that obstructed the flow and added to the debris, but a cascade of projects on each river.

It was, in fact, the presence of these projects that generated the calamity, as they became the reason for human casualties. Not only the project structures but also labourers' tin sheds were built by the river, as against the traditional wisdom of having human settlements away from it. Officers' townships remain at a safe distance while labourers are pushed to bear the risks without even basic systems in place, like a siren system to alert them or basic safety equipment. The projects fail to take such basic steps despite projects like that of the NTPC having suffered damages in floods of 2012 and 2013 as well.

In the case of the 2021 floods, despite the heavy machinery at hand, the tunnel or barrage sites' clearing process remained most inadequate, even as the families kept waiting for some news or remnant of bodies of their kin trapped in the sludge. It also showed the inefficiency of the project companies in addressing disaster situations, and their lack of cooperation with the relief and rescue operations. Their negligent attitude is also reflected from their failure to maintain proper records related to workers' provident funds or insurance. Such an attitude of disregard for the workers' lives and safety has also led the local leaders to demand that a criminal case be filed against them.

Compounding Vulnerabilities

Most projects, like the Rishi Ganga and Tapovan Vishnugad projects, being constructed in the Himalayan regions, are deceptively promoted as "run-of-the-river" (RoR) projects. These projects, instead of using the natural flow of the river and natural elevations as any RoR project would, use dam structures to divert the rivers in tunnels and drop it a few kilometres downstream in order to get a head to produce electricity. The riverbed stretch between the diversion dam and the powerhouse remains mostly dry, as tunnels extend from 10 km–20 km and rivers get channelised in these. The Tapovan Vishnugad project had a proposed tunnel of 12 km. The Ravi Chopra Committee report (2014: 35) notes how a series of dams every 20–25 km of each river in Uttarakhand could convert the rivers into a "series of ponds (reservoirs behind the dams) connected by pipes (tunnels)" and "lead to synergistic cumulative impacts, especially when the zone of influence of one dam overlaps with that of the neighbouring dams."

These projects' practices of blasting for construction as well as the irresponsible dumping of muck generated by the excavation of tunnels, add to the vulnerability of people and the whole region, making them more susceptible to bearing damages.[3] According to the rules, muck disposal sites are to be developed as usable terraces that are covered with fertile soil for plantation, to protect the loose soil from eroding or to enable habitat development. These rules are openly flouted and muck gets dumped by the riverbanks. Often retaining walls are not suitable. Such violations have been noted by CAG (2010) and the Ravi Chopra Committee report (2014). The latter also identifies muck disposal mismanagement as an important reason for the destruction caused in 2013. The local people also related to the author that the projects like Jaypee's Vishnuprayag project identified muck disposal sites after the calamity.[4]

The raised riverbeds, due to the huge quantities of muck, reduce the capacity of containing the increased mass of slush and sediment that the rivers in such regions inevitably carry in flash flood events, while the muck increases their destruction potential. Due to excessive use of explosives for constructing tunnels that often pass below the villages, slopes have weakened, homes have cracked and even collapsed, and fields have developed fissures or subsided. This is seen in the entire Garhwal region wherever hydropower projects are coming up. What chances will such rocks and villages, shaken to the core, have to withstand any disaster?

Further, due to blasting-induced disturbances, water springs have disappeared, and agricultural lands have lost their moisture. Fruit-bearing trees die and the milking animals stop giving milk, with the associated livelihoods getting destroyed. The wild animals due to blasting and loss of forests have started frequenting the villages. Human–animal conflicts have increased as they attack humans and destroy crops. In so many ways, these projects have pitted humans against nature. Villagers also have lost access to forests, rivers, pastures, and cremation grounds (Jain 2016). Disasters, thus, have assumed an everydayness in the villages where hydropower projects are coming up. Like their rivers, however, the carrying capacity of the people, that is, their bearing potential for any disaster has been stretched to such an extent that most express a wish to migrate away from the *pahars* (mountains).

The impacts of these hydropower projects increase manifold due to the presence of not just numerous such projects,

but also other mindless construction activities like the Char Dham highway project with its similar heavy deforestation, blasting, and muck-dumping practices. Further, the impacts of such activities in mountain villages are often not immediate but are more permanent with a spiralling and cumulative effect. It may also not be immediately clear whether a land subsidence happened due to monsoon rains, or blasting done for a road or drawdown effect of a power project reservoir. While the project authorities argue that land sinks and landslides happen even in the areas where the projects are not sited, they ignore the fact that these are necessarily taking place in all the areas where projects have come up. Valdiya (2014: 1663) explains how the project sites are situated in the zones of high seismicity and close to active thrusts, and that these tend to sink due to blasting,

> The belts of active faults are made up of deformed rocks—many-times folded, sheared, shattered and even crushed rocks. These rocks understandably easily break-up, fall-off, creep and slide or slump down when excavated or shaken by earthquakes and explosions, and sink under loads. These incidences are bound to pose a threat to the various structures built in the project areas.

Due to the heavy presence of such projects in the Himalayan region and their impacts on its ecology and village life, as well as the impacts of the climate crisis, again generated by humans, the line between human-made and natural causes of calamities is much blurred. For instance, the Ravi Chopra Committee (2014: 36) report observes,

> It is speculated that when large fractions of river lengths go dry due to multiple projects on them, changes in the micro climate may occur. The temperature in the river valley may increase … In the long run it may also speed up the melting of nearby glaciers.

But the project agencies have been able to evade accountability and responsibility towards the calamities they have created, either in the form of cracked homes and disappearance of water springs or in the form of intensifying floods, by opportunistically terming these as natural calamities. The villagers have found it exceedingly difficult to establish the link between hydropower project practices and their impacts, even as this burden is put on them. In people's minds, the linkage of project construction with disasters is clear, but they are not able to hold the companies accountable, and the links become visible to the outside world only in the case of calamities like the floods of 2013 and 2021.

For instance, the villagers of Chayeen, where many homes and fields had caved in or developed fissures, related to the author how the Jaypee company deposited a sum of a mere ₹80 lakh from its corporate social responsibility (CSR) funds to the district authorities and distributed blankets to fulfil its responsibility towards them. It depicted this as a natural calamity, *devi aapda*. Many such examples are available in the case of other projects as well. Even in the case of storage dams like the Tehri dam, the impact is not just immediate submergence, but the cracks in homes, land subsidence and landslides due to the drawdown effect of the reservoir lake. By identifying damaged homes on the mountains along the rim of the reservoir as "collateral damage," the company has absolved itself of any accountability to rehabilitate them as other project affected and displaced. Compensation is provided citing devi aapda as a reason, and only to individuals, not to the village, further creating an opportunity for arbitrariness and corruption (Jain 2016). Moreover, the disaster potential of the so-called "small" projects in the mountains is also not less, as was evident in the case of the Rishi Ganga project.

'Small' Projects

The Rishi Ganga project that compounded the flood impacts in the case of the Chamoli flood, was operating on the Rishi Ganga river that joins Dhauli Ganga at Reini village, about 23–24 km upstream of Joshimath. The Dhauli Ganga joins the Alaknanda river near Joshimath. The project site near Reini village falls within the Nanda Devi National Park and its buffer zone, and is a United Nations Educational, Scientific and Cultural Organization (UNESCO) world heritage site. This region near Joshimath with the Lata and Reini villages is an important site of the Chipko movement. In fact, it is seen as the epicentre of the Chipko movement in the popular discourse, and for some time now has become the epicentre of hydropower projects.[5]

The locals of this region question how a destructive project could have been allowed there, while they are not allowed to beat their traditional drums, take away simple herbs, graze their animals,

or cut grass in this region, as it has been declared a protected zone. Not only was the project allowed, but it was also allowed to undertake excessive blasting, stone crushing, tree felling, illegal mining, and reckless dumping of muck next to the riverbed. These practices continued despite the project changing three owners in the last 15 years, all three businessmen who had no experience or history of running hydro projects,[6] leave alone in such a sensitive zone. The Reini village petitioned in the high court in 2019 and also approached the National Green Tribunal (NGT) seeking the stoppage of such destructive practices, but did not get much in the way of relief (Mazoomdaar 2021).

The conservation-related regulations in this region have meant the severing of the organic link of the villagers with their environment, and curtailment of their livelihoods depending on it. Moreover, the push for such development here defeats the purpose of the conservation efforts. Eventually, many of the descendants of the Chipko movement, the symbols of ecological consciousness and conscience, have been reduced to become small-time contractors or being employed as workers for destructive projects. Battered after the 2021 disaster, the villagers are afraid to live in Reini and are demanding to be relocated.

Technically, the Rishi Ganga at 13.2 MW was a small project (less than 25 MW). Small projects, however, are but a smaller version of the large projects in Uttarakhand, with the same design of dams diverting rivers in tunnels, causing riverbeds to dry, and involving the same practices of blasting, deforestation, and muck dumping that makes them equally hazardous. Like the large "ROR" projects, they also involve excavating for diversion, main, and adit tunnels, and construction of road networks, cofferdams, diversion dams, residential structures, and powerhouses. Thus, even a small project built in this manner involves what Valdiya (2014: 1663) terms as excessive "tampering with the natural balance" in these zones of "very weakened rocks." From the projects that are getting built in Uttarakhand, neither are the large ones green, nor the small projects benign. Both "ROR" and "small" projects remain but an appropriation of the language of alternatives to create confusion and gain some legitimacy for these.

Small projects do not reflect the essence and spirit of small as visualised by the socio-environmental movements, that is, projects owned and run by the community that remain accountable for them, and whose design and functions suit and emerge from the local conditions and needs. Instead, smallness in the case of "ROR" projects has been used only as a convenient excuse for exemption by the private players from the environmental impact assessment (EIA). The draft EIA Notification, 2020 has further diluted conditions by providing that such small projects will need neither EIA, nor public consultation, alongside paving the way for them to come up within the buffer zone of the protected and eco-sensitive areas (Pradhan 2020).

Further, these projects compound the disastrous impacts of other small and large projects. The smaller mountain rivers are not more manageable or controllable, for which such projects strive. Even small rivers tend to carry with them large silt loads, constituting rocks and big boulders, which they mobilise flowing through steep slopes. In the 2013 disaster, the debris carried by the Khiron Ganga led to the destruction of the Vishnuprayag project. Similar was the story of the Asi Ganga river in Uttarkashi during the 2012 flash flood.

Tapovan Vishnugad Project

The flash flood of February 2021 destroyed the barrage of the 520 MW Tapovan Vishnugad project, getting built near Tapovan and Dhaak villages, about 14–15 km uphill from Joshimath. It flooded its tunnels with debris, where hundreds of labourers were working. The arrangements by the company of keeping a tab on the exact number of workers, alarm systems to alert them of the danger, or ensuring their safety were missing.

The NTPC, a thermal power company, has been invested in the construction of this hydropower project for more than 15 years. Its practices have remained rather irresponsible and show a lack of thoroughness in appraising the geological conditions of the region. Moreover, it has employed different private companies for different activities, like barrage construction and excavation of tunnels, enabling it to shirk off its responsibilities on to these sub-players. In the initial period, it employed the use of a tunnel boring machine (TBM), which has been stuck at one end of the tunnel since 2009. Meanwhile the company switched to excavating the tunnel from the other side. The TBM had punctured an aquifer that discharged "about 60–70 million litres daily, enough to sustain 2–3 million people" (Bisht and Rautela 2010: 1271), wasting away water that must have accumulated over years under the Auli oak forests.

Its EIA report shows how it conveniently ignored expert opinions. It has been noted therein that the Geological Survey of India (GSI) advised it to shift its site downstream after encountering hot water springs during drilling. GSI was apprehensive that hot water springs would be encountered during the driving of the tunnel. However, the company reports that it did not follow this suggestion as it would have caused loss to the project of about a hundred megaunits (MU) (National Thermal Power Corporation Ltd 2004).

Hearing a plea of the residents of Tapovan against muck mismanagement by the NTPC in 2019, the NGT directed an expert committee with the Uttarakhand Pollution Control Board (UPCB) as the nodal agency to conduct a site visit (*Gram Pradhan & Residents of Tapovan v State of Uttarakhand* 2020). The UPCB, after observing non-compliance of the actions suggested by it, fined the NTPC ₹57,96,000 on "polluter pays" principle, for violating muck disposal site maintenance norms that resulted in "severe mass erosion" and damage to the environment. This was upheld by the NGT in an order dated 18 February 2021 (*NTPC Limited v Uttarakhand Pollution Control Board* 2021).

During my doctoral fieldwork in this region in 2015 (Jain 2016), local people had related that due to the company's muck dumping practices, at places, the width of the Dhauli Ganga had decreased to one-fourth of its size. The company had devised a dubious method of evaluating the impact of blasting when met with complaints by the villagers of cracks in

their homes. It pasted strips of glass at the cracks and told people that the breaking of these strips would prove if blasting had any impact on the creation of such cracks. After this exercise, never again did the company come back to check the strips, and people eventually plastered the gaps themselves.

In a few villages, women complained that milking animals gave less milk as they consumed the blasting powder on the grass and many of the pregnant animals aborted. Water springs had dried at many places after the project work started. Faced with acute water shortage, they were provided with temporary arrangements of water supply with hose pipes, which people complained was not clean. In the Dhaak Tapovan area, villagers had complained of significantly reduced yields of potato and *rajma* (kidney beans), falling to even one-fourth of the earlier yields. Valdiya (2014: 1663) explains that the tunneling procedure is like opening the underground drainage that significantly alters the groundwater regimes of the mountains. This results in "drastic lowering of groundwater table and attendant drying up of springs and dwindling of surface flow in streams." Bisht and Rautela (2010: 1271) also explain how this happens,

> sudden and large scale dewatering of the strata has the potential of initiating ground subsidence in the region … Reduced ground moisture regime would result in depleted biomass availability and crop produce … It would also impact floral and faunal diversity.

Like other projects in the area, the NTPC also ignored the concerns and opinions of the local people in the public hearing held in Joshimath. There, however, remained a strong opposition to the NTPC project in the town of Joshimath, as well as in the affected villages. The company employed many strategies to break the protests. Police cases were filed against many. The youth of many villages were initially given and then expelled from work. Gifts were distributed in the villages and to the eminent persons of Joshimath by the company to smoothen its work ways (Jain 2016).

Protesters in Joshimath banked on the Mishra Commission report, that way back in 1976 had said that the town and the surrounding villages have settled on an ancient landslide that is sinking (also reiterated by Valdiya [2014]); it is a deposit of sand and stone, not hard rock that could hardly take the pressure of the township itself. The report had recommended restrictions on heavy construction work, blasting, heavy traffic, felling of trees, and even on agriculture (Jain 2016). However, despite the geological and environmental vulnerability of the area, many hydropower projects were planned around Joshimath. The tunnel of the Tapovan Vishnugad project "traverses all through the geologically fragile area below Joshimath" (Bisht and Rautela 2010: 1271).

Deception of Development

Over the years, as the work of a hydropower company persists and proceeds, along with the protests, compromises also get materialised. Often in remote areas, project companies gain entry by promising basic amenities that the government has failed to provide, for instance, a health facility, or a stretch of road, and more importantly, promises of providing work, so that men need not migrate. However, these projects have provided neither appropriate or required employment opportunities nor electricity to the villagers. Even though the projects become operational, the feeling of fear and apprehension in this calamity-battered region and the discontent attached with their opportunist strategies to gain entry and operate in the area means that the project companies never really gain legitimacy in the area.

These projects have been pushed hard as development by the state government despite all kinds of disasters and difficulties that they have resulted in. That most paharis (mountain dwellers) wish to flee from the pahar or are forced to migrate in search of livelihoods and safe places to stay, is a deafening pronouncement of the failure of the development path taken by the state, and frustration of the aspirations behind the movement for statehood. The high rate of outmigration, the existence of thousands of "ghost" villages (Kapur 2015), and development that remains unconcerned with the local concerns and needs, and unsuitable for the locale makes one wonder if, in the long term, the mountains will stand only to showcase the technological ingenuity and development, as "sterile monuments bereft of people who trodded on them lightly" (Berreman 1983).

The hydropower projects by becoming a cause of cracks in homes, weakened slopes, and subsidence of village land, have made the pahar and paharis more vulnerable. The trauma of events like that of 2013 and 2021, and the images of damages caused to their kin and homes haunt them and it becomes difficult for them to feel at home in their villages. Monsoon months have become a nightmare for most villages as landslides and cloudbursts have become more common, especially in the Garhwal region with its numerous "ROR" projects and the Tehri dam.

When calamities like the 2021 flash floods strike, understandably the demands of scrapping projects in the sensitive Himalayan region become loud. Questions also get raised, for instance, by Bhatt (2021), on the brazen mindlessness of pushing for colossal structures like the 315 m high Pancheshwar dam on the Mahakali river in the Ganga basin. Bigger than the Tehri, this 5,040 MW dam will affect lakhs of trees as well as protected areas, as it involves impounding an area of 116 sq km in this region of high seismicity and ecological sensitivity. Such disasters-in-making ought to be stopped when it is clear that even impacts of the Tehri dam are still unfolding as the reservoir has led to destabilisation of the mountains on its rim on which hundreds of villages reside.

Calamities like the Chamoli flash floods make some dangers of hydropower projects visible to the world. But the everyday disasters that the villagers are facing ought to be accounted for as well. By stalling such projects that are taking away from people their livelihoods, water sources, the safety of homes, and rivers that are crucial for dwelling as well as letting go of their dead, a bigger disaster can be prevented in Uttarakhand. This disaster is the fear that the paharis now feel in their own homes and the erosion of their identity and sense of belongingness with the pahar.

NOTES

1 This particular area of Chamoli district has already seen the highest magnitude flood of the last 600 years in the Alaknanda floods of 1970 (Ravi Chopra Committee 2014) and an earthquake of 6.8 on the Richter scale in 1999.

2 For instance, the union power minister who reached the site after the floods claimed that the Tapovan Vishnugad barrage mitigated the damages and work on it should start soon (*Hindustan* 2021). Similar claims were made for the Tehri dam in the 2013 floods. The chief minister in his tweet of 8 February 2021 also defended the projects by saying that such calamities should not become a reason for "propaganda against development."

3 For instance, in the 2013 floods, thousands of cubic metres of muck piled by the riverside by the Srinagar project buried the houses of Srinagar town.

4 Such observations throughout this article about project practices and impacts are made on the basis of the doctoral fieldwork conducted during 2012–15 by the author in Uttarakhand. This multisite ethnographic work included the area affected by the Tehri dam and the projects coming up on Alaknanda and Mandakini rivers, amongst others (Jain 2016).

5 The Rishi Ganga has two proposed projects, Rishiganga I (70 MW) and Rishiganga II (35 MW) in addition to the damaged project. In addition to the Tapovan Vishnugad project, the NTPC also has the proposed Lata Tapovan Project (170 MW) upstream, whose work has not progressed due to a stay by the Supreme Court. Other bumper-to-bumper proposed projects on the Dhauli Ganga upstream of the Lata Tapovan are Malari-Jhelum (114 MW), Jhelum-Tamak (126 MW) and Tamak-Lata (250 MW). The Alaknanda has many projects in different stages, with a few being the Vishnuprayag project (400 MW) near Joshimath, and the Vishnugad Pipalkoti project (444 MW) and Srinagar project (330 MW) downstream.

6 This holds true for most hydropower projects in Uttarakhand, where project companies are from backgrounds that have nothing to do with hydropower. Further, project trading like this absolves the seller company of any irregularities carried out in clearances and payments as well as its responsibilities towards the affected villagers.

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