Ganga

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Greener Hirapur – An IRBMS Initiative

Commentary

The India Meteorological Department (IMD) declared the complete withdrawal of the southwest monsoon by mid October, closing the chapter on this year's rainy season. Almost simultaneously, the northeast monsoon set in over Tamil Nadu, Puducherry–Karaikal, Coastal Andhra Pradesh and other southern states. These regions have begun witnessing bursts of rainfall, accompanied by thunderstorms and lightning. In contrast, most interior parts of the country have slipped into dry spells.

This monsoon season has been climatically significant one . August stood out for its turbulent rainfall behaviour, with over 20 extremely heavy downpour events—a striking rise of nearly **50%** from last year's events. Even more notable was the rainfall pattern across North India, which recorded unusually high rainfall in June, July, and August—a rare sequence not observed since 2013. While last August registered more "heavy" and "very heavy" rainfall days, this year tilted toward a greater frequency of "extremely heavy" rainfall events, signaling an intensification of extreme weather episodes with broader climate variability trends.

As temperatures begin to ease, the weather has become more pleasant across much of the country.

Yet, this comfort is overshadowed by a familiar seasonal challenge: worsening air quality. The Air Quality Index (AQI) across several parts of Delhi and the NCR has slipped into the *poor* and *very poor* categories. Unfortunately, this is not an NCR-exclusive issue. Many metropolitan and emerging urban centres across India are now shrouded in degrading air quality, reminding us that pollution control must become a sustained national priority rather than a seasonal firefight. These weather and environmental signals offer a crucial reminder: climate resilience and air-quality management must move in tandem if we are to safeguard the health of our rivers, landscapes, and communities.

NEWS

Understanding Soil & Groundwater Challenges in Baropahar, Rajmahal Hills

As part of the ongoing Sarunala Rejuvenation Initiative—implemented through an integrated watershed management approach—the Integrated River Basin Management Society (IRBMS), in collaboration with Jharkhand Vikash Parishad and with financial support from AID, USA, has undertaken a series of conservation measures over the past six years. Sarunala, a tributary of the Bansloi River, flows through the ecologically sensitive Rajmahal Hills, home to the Paharia and Santal communities.

Traditionally, the two communities occupy distinct landscapes:

- Paharia households live on the flat-topped hills and practice upland cultivation known locally as *Karua Khesti*—clearing bushes on hilltops and slopes for farming.
- Santal households prefer the valley floors where they primarily cultivate paddy.

Impact assessment studies by IRBMS reveal that although Paharia families typically possess larger landholdings than Santal households, their average annual income is significantly lower. A key reason is the severe soil erosion on hilltops and the progressive decline in water availability in the upland Paharia settlements.

To understand the hilltop land condition and develop suitable measure, IRBMS recently conducted a detailed hydrogeological assessment in Baropahar, a hilltop Paharia village. The study employed geophysical resistivity surveys, terrain analysis, and field observations to understand subsurface conditions, groundwater potential, and opportunities for water conservation.

Field investigations revealed noticeable geological and hydrogeological contrasts across the hilltop. Topsoil thickness varies significantly, from about 4.5 m in the North-East to only 1 m in the South-West. The South-West ridge has shallow hard basaltic bedrock, which restricts infiltration and limits groundwater recharge.

The North-East side has thicker lateritic soil layers, offering better prospects for perched aquifers and shallow subsurface water storage. These variations directly influence groundwater recharge potential and determine what types of watershed interventions will be effective.

Based on resistivity data and terrain assessment, the study proposes site-specific watershed interventions. North-East Baropahar with Thicker lateritic cover and moderate resistivity suitable for farm ponds, percolation pits, and shallow recharge structures. The South-West Ridge having thin soil cover and massive basalt beneath and is suitable for stone bunds, recharge pits, check structures, and runoff control measures to enhance soil moisture .

The findings from Baropahar will guide ongoing collaboration with local communities and help shape future interventions for sustainable water management in the region. These integrated hydrogeological studies reflect IRBMS's commitment to evidence-based, scientifically grounded, and community-aligned watershed planning in rural Jharkhand.

RIVERS OF INDIA

Godavari River
(Part - 8)
Indravati River Sub-basin

The Indravati River, one of the major tributaries of the Godavari system in central India, begins its course in the Dandakaranya hill ranges situated in Odisha's Kalahandi district. Its source lies near the hilltop settlement of Mardiguda in the Thuamula

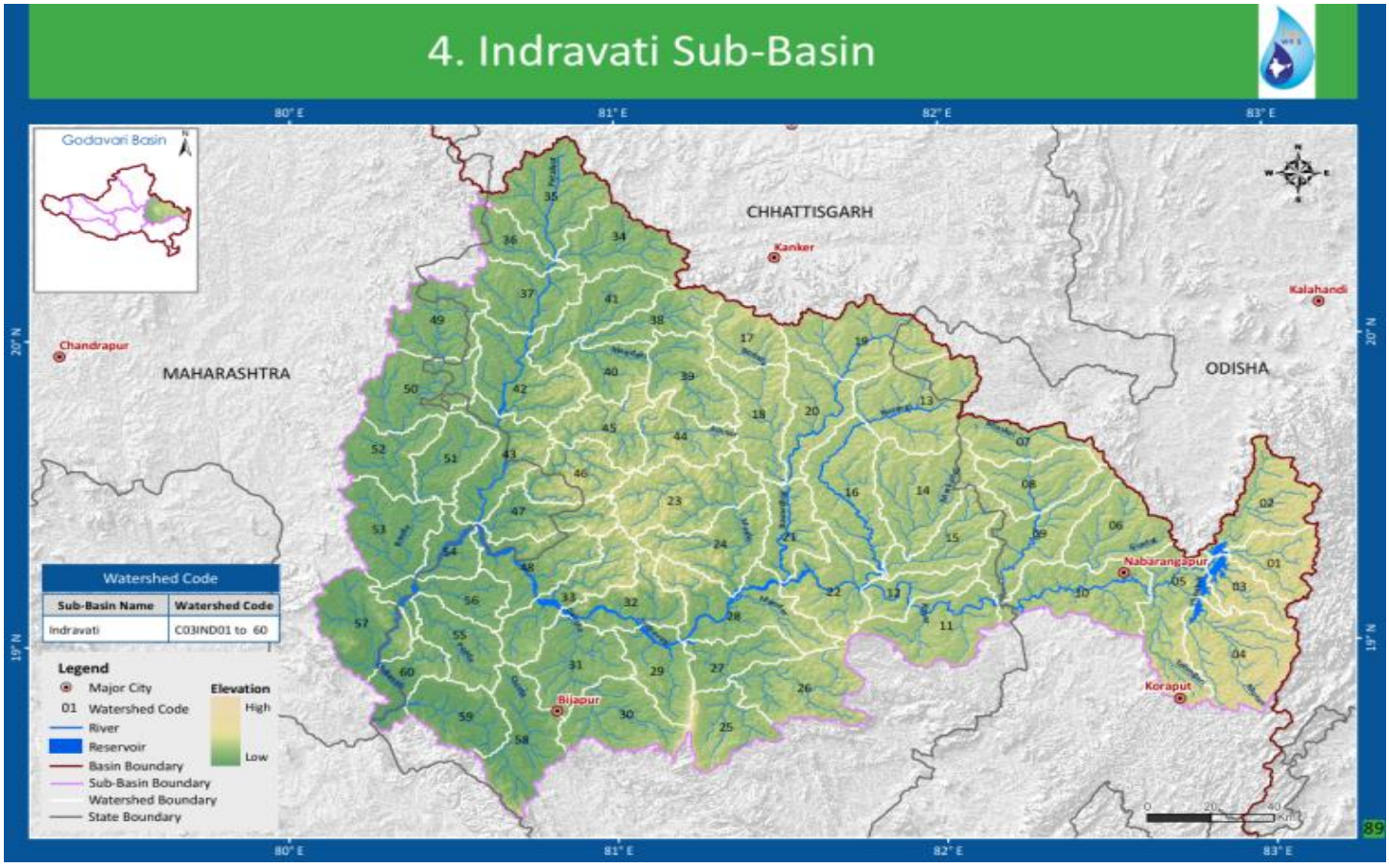
Rampur Block, where three small streams converge at an elevation of roughly 914 meters on the western slopes of the Eastern Ghats. From this point, the river travels westward through the districts of Kalahandi, Nabarangapur, and Koraput for about 164 kilometers, after which it briefly forms a 9.5-kilometer stretch of the boundary between the states of Odisha and Chhattisgarh .

Upon entering Chhattisgarh near Jagdalpur, it continues across the Bastar region for approximately 233 kilometers. Eventually it bends southward, running nearly 129 kilometers along

the border separating the States of Chhattisgarh and Maharashtra before finally emptying into the Godavari near Bhadrakali village in Bijapur district, located at the intersection of Maharashtra, Chhattisgarh, and Telangana states.

Over its entire length, the river covers about 535 kilometers, and its drainage basin extends across nearly 41,665 square kilometers. Of this, the sub-basin occupying Odisha is around 7,435 square kilometers, while the remaining area spreads largely across Chhattisgarh, making the Indravati one of the most important rivers of the region as one of India's most rich and ecologically rich landscapes, dominated by dense forests, varied wildlife, and undisturbed natural environments.

The river holds deep cultural meaning for the people who live along its banks, particularly in the Bastar district of Chhattisgarh, is often honored as the "lifeline of Bastar" supporting the environment, traditional lifestyles and customs of the tribal communities. Among these groups, the Maria Gond tribe maintaining a particularly close relationship with the river resides mostly to the south of the Indravati, and well known for its distinctive ceremonial headgear crafted from bison or cattle horns and adorned with peacock feathers



as symbols of honor, lineage, and unity, carefully preserved and passed from one generation to the next. The daily life activities of tribal families depend heavily on the river and the forests around it collecting mahua blossoms, to use for preparing food, extracting oil, and producing the traditional local liquor essential to numerous social and religious ceremonies. This deep reliance illustrates the spiritual, economic, and cultural significance of the Indravati in shaping the identity of its indigenous inhabitants.

The Indravati River system is supported by numerous tributaries and feeder streams namely, Keshadhara Nalla, Kandabindha Nallah, Chandragiri Nalla, Golagar Nalla, Poragarh Nalla, Kapur Nallah, the Muran River, Bangiri Nallah, Telengi Nallah, Parlijori Nallah, Turi Nallah, Chourijori Nallah, Damayanti Sayarh, the Kora River, Modang River, Padrikundijori River, Jaura River, and the Bhaskel River. On the northern and eastern sides, its right-bank tributaries consist of the Bhaskel, Boarding, Narangi, Nimbra (also known as Parlkota), Kotri, and Bandia rivers, while the Nandiraj River is the primary left-bank tributary. Together, these streams enrich the river's flow, nourish the surrounding forests, and help maintain ecological balance across the basin.The Upper Indravati Hydro Power Project, popularly known as the Indravati Dam, located near Mukhiguda in Odisha's Kalahandi district stands among the largest dams in both India and

Chitrakoot Falls on Indravati River

Asia, and it is the biggest hydroelectric project in eastern India with an installed capacity of 600 MW, playing a major role in generating electricity and providing irrigation to vast agricultural lands by diverting water from the upper reaches of the river into the Mahanadi valley.

Apart from this main project, several additional hydroelectric schemes—such as Kutru I, Kutru II, Nugur I, Nugur II, and Bhopalpatnam—were proposed at various times along the river, but none was ultimately implemented as opposed by the conservation groups and local activists. Under the Godavari Water Disputes Tribunal's Interstate

agreement, Odisha is required to maintain a minimum discharge of 1.3×10^9 cubic meters (or 45 TMC) at the border shared with Chhattisgarh to ensure fair distribution of water and downstream ecological balance.

Source:
1)Water shed atlas Government of India.
2)International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2763 Issue 07, Volume 3 (July 2016) Dr. P. D. Dahe & Miss B. B. Deshmukh.
3)Past, Present and Future of Indravati River Capture. A Geomorphological Investigation Article in IOSR Journal of Applied Geology and Geophysic · January 2014 by S. D Deshmukh & K.R. Hari.
4)https://journaljsrr.com/index.php/JSRR/article/view/2818 https://www.scribd.com/document/722951388/Indravati-River-Project
5)https://www.newindianexpress.com/states/odisha/2019/Jul/31/odishas-indravati-river-swelling-10-villages-marooned-2011928.html.

Special Feature

The Himalayan disasters and climate change – a new reality

(*Concluding Part)*

Mr. Prasoon Singh of The Energy Resources Institute's Earth Science and Climate Change Division based in New Delhi told the Reuters that many anthropogenic factors in the form of deforestation of a large area on the slope, land grabbing by the real estates, land management policies by the authority etc all led to this catastrophe. The permission by the authority to construct buildings and other development in the abandoned river bed is highly responsible for disaster.

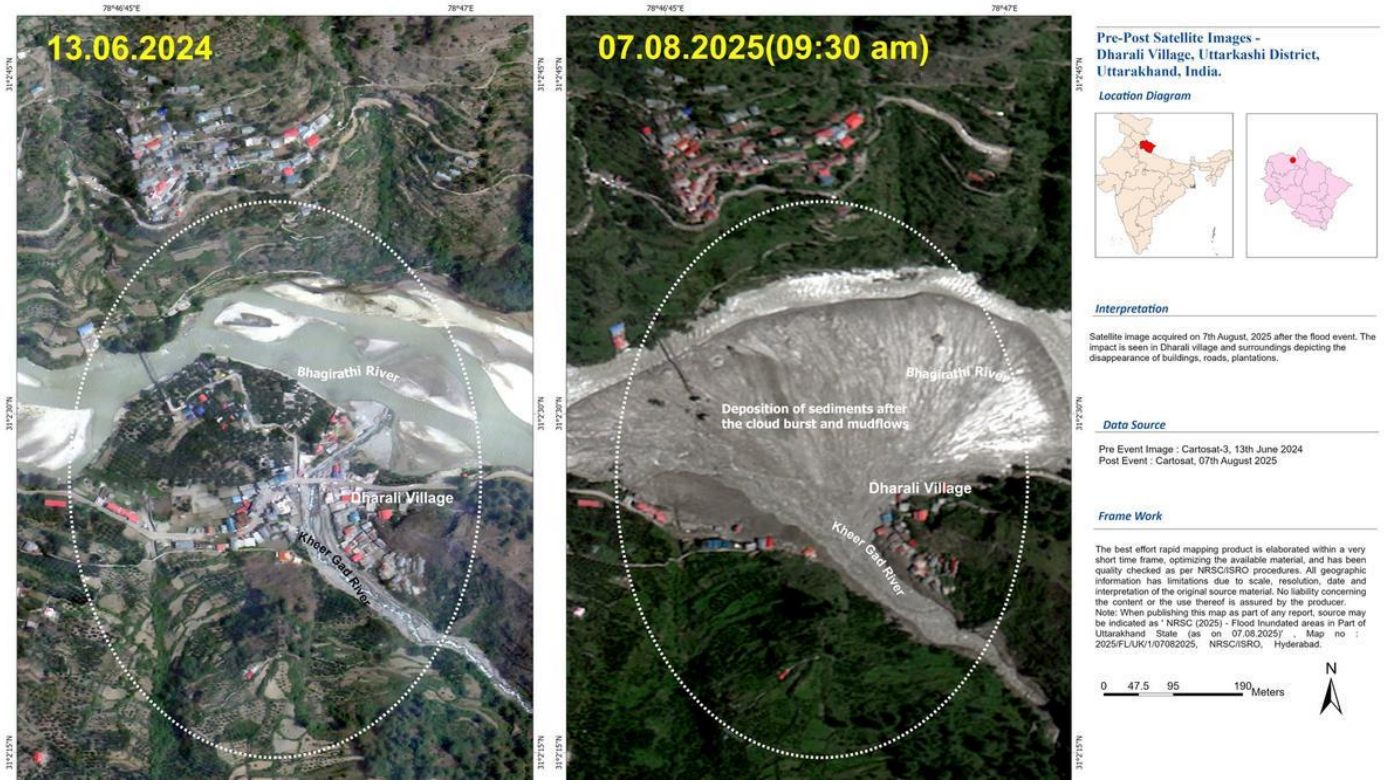
This fits the real situation as we find in the case study of Dharali disaster occurred in 2025.

Disaster at Dharali

The flash flood at Dharali, the Himalayan village only 18 km from Gangotri Dham, situated on the Bank of Bhagirathi River and Kheer Gad/ Kheer Ganga River near Harshil in Uttarkashi, Uttarakhand, swept nearly half of its settlement area triggered by intense rainfall on August 5, 2025 with gushing water with fast moving mudflow, sludge, concrete debris and landslides damaging a number of houses, hotels, restaurants and homestays, infrastructures along with several number of vehicles with loss of many human lives and injury.

As seen in satellite image the deluge widens stream channel with redesigned river morphology leaving a fan shaped deposit of mud and debris. The deluge caused by the cloudburst, occurred in the catchment area of the Kheer Gad/ Kheer Ganga stream, forced the Bhagirathi River toward Mukhwa, disturbing the river's natural flow first striking Dharali in one side of the hill and village Sukhi Top in another side later. Dharali experienced cloudbursts before also in 1864, 2013 and 2014 leaving devastating impact along the Kheer Ganga stream.

The geologists has been warning the administration after every disaster to shift the



village as Dharali is highly vulnerable in the context of disaster management and relief operations. According to senior geologist Prof. S.P. Sati, Dharali sits on the Main Central Thrust, a fault line of the Trans-Himalayas with a height of above 4,000 metres. This fault line, an extremely earthquake-prone zone connects the main Himalayas to the Trans-Himalayas. The Kheer Ganga River flows from the mountain at 6,000 metres, so, no wonder flash floods generated from such a height destructed massively on Dharali.

It seemed that a part of the mountain which came off nearly six months ago and kept hanging on Kheer Ganga river dislodged this time generating colossal impact with mudslide, landslide, gigantic volume of debris, water flows leading to huge flash floods leaving 30 feet of accumulated debris after the disaster.

In Dharali, the famous Kalp Kedar Temple of 1500 years, a part of the Panch Kedar tradition, situated on the bank of Bhagirathi, was also under the debris after the disaster.

Causes of Catastrophe

After the analysis of the above case studies , occurred this year it came out as broad daylight that many human induced activities are main causes for the catastrophic disasters in the Himalayan region and the most important of these are the following-

River's natural path of flow – on the mountains the rivers and streams with narrow channels follow the steep slope gradient with very little widening of rivers. But where the streams meet another river

with a broad mouth it widens up. When the big river shifts a little away from its earlier channel, many development work set in the new land of the abandoned part of the channel to meet the pressure of the tourism which exactly happened in Dharali. The Kheer Gad stream meets the Bhagirathi River and at the confluence it is seen from the satellite image that Bhagirathi shifts a little away from its old channel which became quickly a busy settlement area with multistoried buildings, hotels, restaurants and other activities. Interestingly, this newly developed part was totally wiped out by the gigantic force of water and the mudflow during the disaster when much of the older part of the Dharali settlement is saved.

Actually, in the higher altitude, new settlements come up in abandoned part of the River without analyzing the geomorphology of the area, without much understanding of the development process of the land and without understanding the flow dynamics of the river water. Though it is an abandoned part of the river yet it is a part of the river bed which will be filled up any time by the river with increasing volume of water.

Excessive sedimentation is another cause: Millions of tons of sand, gravel and stones are eroded in the upstream areas of the geologically active Himalaya and creates high possibility of flood hazard for the settlements along the streams and rivers. Reduction of rate of erosion in the geologically active Himalaya is hard. So the selection of area for settlement as well as building codes are to be followed in very judicious and stringent way.

Violation of Building Codes - Building codes in terms of building height, design are very critical part of any type of development in plains , hills and especially on the Himalayan altitude. The height of the building, type of rocks, altitude matter on the mountainous slopes for any settlement development on high altitudes as multistoried structures on unstable slopes accelerate disaster risks. But in recent years these are highly violated on the Himalayan region with the growth of the settlements and infrastructures due to flourishing tourism business. Here comes the role of the local administration which is failing to take stringent measures and actions to stop any violation of building codes, implementation and prohibition of zoning of development.

Encroachment – Encroaching settlement and other development work on forest and open land area also damage the balance in ecology and carrying capacity of the local topography thus making the whole area vulnerable for erosion, flood, flash flood and landslides - particularly in the regime of climate change.

Cutting trees indiscriminately- Indiscriminately cutting trees is another cause which triggers flash floods carrying debris with boulders making devastating impact in the downstream areas. Trees anchor the loose sediments and protect the soil

cover stabilizing the sediments removal of which destabilizes the slope. So planting trees, strict bans on felling trees, community forests are very essential for resilience and to combat the change of climate issues.

Construction of all-weather roads – The construction of all-weather roads and widening of roads is creating havoc in the higher altitude area. To encourage the continuous flow of vehicles to attract more tourists and to allure them to more interior fragile zones of the Himalayas, the all-weather widened roads are constructed forming a network of roads which create a menace to the serene environment of the area. Earlier the flow of tourists was less and the roads were almost closed during rainy season thus checking the continuous flow. Continuous movement of traffic, emissions, noise, aerosols, blinking horns – all put the ecology and local weather of the Himalayas in distress and constant pressure worsens the vulnerability particularly in the time of climate change as found in recent Himachal Floods.

Though the climate change phenomena has already increased the frequency of flash floods, glacial lake outburst, floods and making it a big challenge in the high altitude yet the human negligence in the form of irresponsible and reckless development, deforestation, code violations, planning and implementation magnifying the scale and ferocity of these disasters many fold in the Himalayan surroundings. What could have been manageable hazards earlier have become catastrophic events now. The tragedy is that many of these disasters are preventable if ecological wisdom and strict governance are prioritized over short-term tourism profits.

Is there anyone to listen?

Source:
1) *www.rediff.com/news/report/pix-cloudburst-wreaks-havoc-in-uttarkashi-homes-hotels-swept-away/20250805*
2)*www.rediff.com/news/interview/you-will-see-more-devastation-in-uttarakhand/20250806*
3)The Hindu, August 08, 2025
4)ISRO Satellite Images before and after Dharali Disaster

Editor- Suchandra Choudhury, Published by Girija Sankar Chattopadhay, IRBMS, and Advisor: Sujit Choudhury. Assisted by Nilshikha Das, Ayan Kumar Samaddar (© Integrated River Basin Management Society)