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ANALYSIS ENVIRONMENT

Nightmare in Wayanad: Torrential Rains Triggered Landslides But Climate Change May Not Be the Sole Culprit

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04/Aug/2024 5 min read



Climate change may be to blame but so is land-use change – including a tourism-driven real estate boom that has led to more construction – in the ecologically fragile district, experts say.



Rescue operations in Wayanad. X/@04NDRF

Bengaluru: Unrecognisable dead bodies. A raging river carrying some of them, even body parts, to another district downstream. Sobbing families searching in vain for any signs of their loved ones who are still unaccounted for. Ambulances ferrying not just the dead to mortuaries, but whatever bits and pieces of human remains that rescue personnel came across. Today, all that remains of some once-picturesque villages in Wayanad district in north Kerala is slush and mud-coated debris,

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ripped-apart trees, buried homes, broken lives and dazed survivors.

Wayanad is living through a nightmare after multiple landslides — in the early hours of July 30 (Tuesday) — triggered by torrential rains buried entire neighbourhoods near Meppadi in Vythiri taluk in the south-eastern part of the district. Several agencies and teams were immediately pressed into action for rescue efforts including the State Disaster Management Authority, the National Disaster Response Force and the Indian army, navy and airforce.

How many people are still missing after the landslides in Wayanad?

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As of August 3, the death toll has risen to 308, as per Veena George, the state's health minister (although the CM announced it to be 215 on August 3). As many as 206 people are still missing; more than 10,000 survivors are residing in 93 relief camps in the district. Many survivors have no tears to cry — numbness and shock have set in.

A couple of days before the incident occurred, the area witnessed torrential rains: as much as 572 millimetres of rainfall in just 48 hours. While heavy rains are the norm in the district during the monsoon, scientists told *The Wire* that climate change — which is known to cause intense rains in very short periods of time — played a role in the landslides that Wayanad witnessed: something Kerala's chief minister also spoke of in an address to the media after the incident. But along with climate change, a host of other factors — including land-use changes such as land fragmentation, and a tourism-driven real estate boom that has led to more construction — in the ecologically fragile area are also as much to blame, several experts told *The Wire*.

Torrential rains and landslides

Between 2 and 6 am on July 30, multiple landslides occurred in the villages of Mundakkai, Chooralmala, Attamala and Noolpuzha in the south-eastern part of Wayanad district .

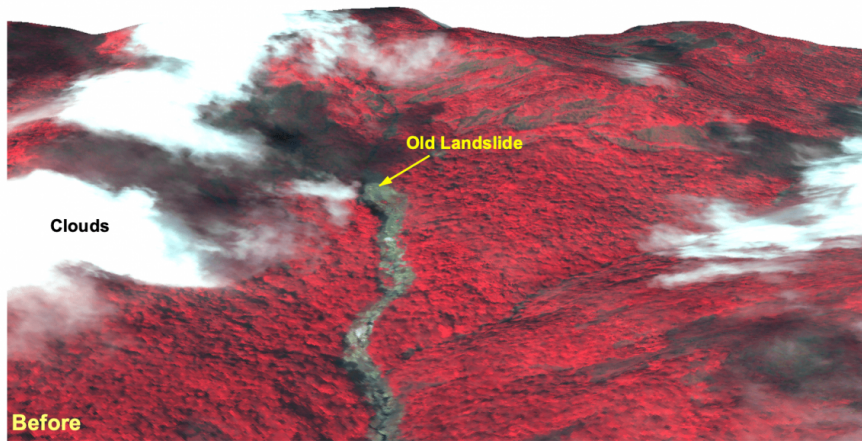
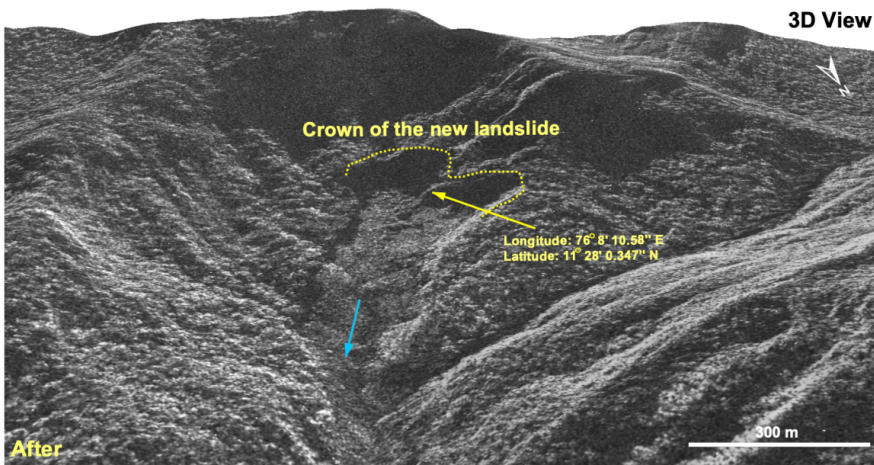
The devastation was the most severe in Mundakkai and Chooralmala — landslides buried entire neighbourhoods here under mud and debris. So much so that even locals are unable to figure out now where their or their friends' houses stood, a survivor remarked to a television channel.

Rescue efforts began immediately — several agencies and teams including from the District and State Disaster Management Authorities, National Disaster Response Force, the Indian army, navy and airforce were pressed into action. Volunteers from across the state, and cutting across political lines, have also joined in. On August 2 (Friday) on the fourth day of rescue efforts, personnel **rescued** a family of four whose house had been cut off, but miraculously remained standing, after the landslide. Guards of the state forest department **rescued** a tribal family of four who were stuck on the hill of Attamala on August 3.

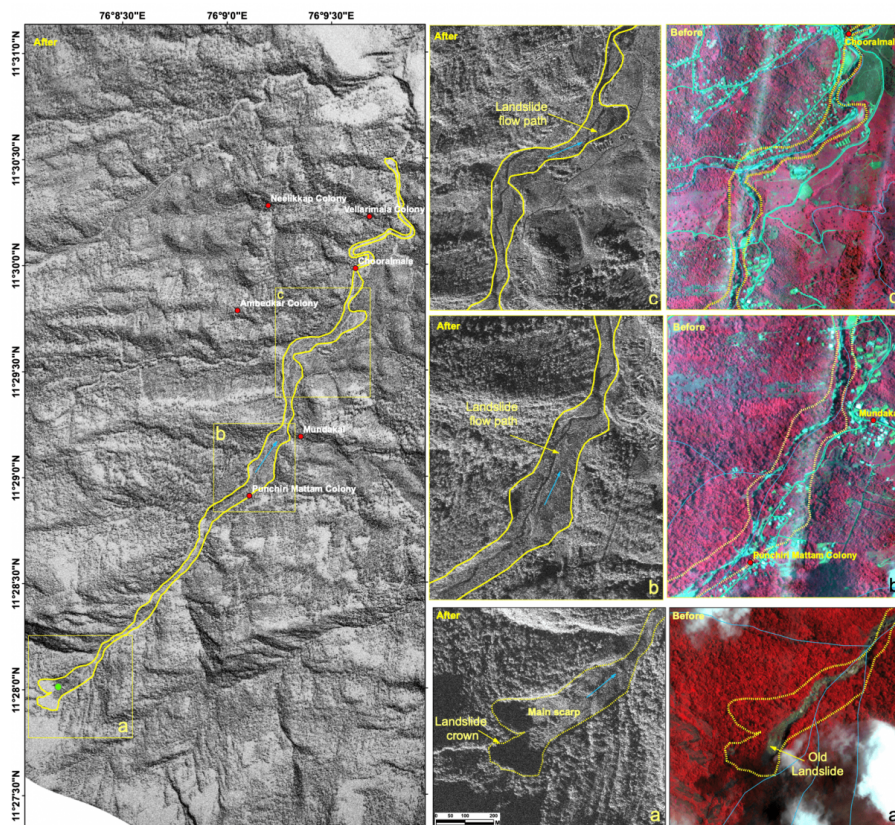
But good news has been little and far in between. It's mostly a very grim picture in and around Meppadi — the Primary Health Centre in the town has been converted into a temporary mortuary, and post-mortems are being conducted here. Entire families were buried alive in their homes; some who survived are even combing through body parts to see if their loved ones — still unaccounted for — are among the dead. Many children have been orphaned. Several of the dead bodies retrieved are unrecognisable, these have been sent for DNA tests for identification.

On August 1, the ISRO's National Remote Sensing Centre **released** two high-resolution satellite images of the landslide site at Chooralmala. They revealed that 86,000 square metres of land moved downhill; per the NRSC, "a major debris flow was triggered by heavy rainfall," widening the course of the Iruvanjippuzha that flows near the affected areas.

On the same day, addressing the media, chief minister Pinarayi Vijayan said that heavy rainfall caused by climate change was to blame: the area received a whopping 572 mm of rainfall in 48 hours before the incident took place, he said. Vijayan also touched on the issue of climate change — rainfall coming in short, intense bursts — in his **media address** on August 3.



Source: NRSC



Source: NRSC

“Climate change is drastically changing rainfall patterns in Wayanad,” Mariam Zachariah, research associate at Imperial College London, who studies climate change and extreme weather events caused by it, told *Climate Trends*. “What was once a cool, humid environment with year-

round drizzles and monsoon rains, is turning into one marked by drier, hotter summers and intense downpours during the monsoons. This change has increased the risk of landslides. Dry soils absorb less water and heavy rainfalls cause run-offs that can lead to landslides, such as the ones we've seen this week.”

The warming of the Arabian Sea is forming deep cloud systems that are causing extremely heavy rainfall in Kerala in a shorter period and increasing the possibility of landslides, climate scientist S. Abhilash, director of the Advanced Centre for Atmospheric Radar Research at Cochin University of Science and Technology **told PTI** on July 30.

Warnings: Ignored, or none given at all?

On August 1, Union minister of Home Affairs Amit Shah claimed in parliament that the Union government had given early warning to Kerala about heavy rains – as early as July 23, seven days before the landslide in Wayanad occurred. He even gave his approval for nine NDRF teams to leave for Kerala on that day, he said while speaking in the Rajya Sabha. Chief minister Vijayan **contested his claims**, saying that Kerala did not receive a red alert – not in time, at least.

The Wire analysed the alerts given by the India Meteorological Department (IMD) between July 23 and July 30. The IMD's **press release** on July 23 mentioned that “very heavy rainfall” was “very likely at isolated places over Kerala and Mahe on July 25,” and that “heavy rainfall” was “very likely at isolated/some places” over Kerala and Mahe between July 23 and 27. The IMD's **alert on July 24** again talked of “heavy rainfall” being “very likely at isolated places” over Kerala and Mahe from July 24 to 27. The **July 25 alert** spoke of “heavy to very heavy rainfall at isolated places” over Kerala as of the morning of July 25 for 24 hours, and of “heavy rainfall” being “very likely at isolated places” over Kerala from July 25 to 29.

The IMD's **July 25 outlook for the following two weeks** mentioned that “very heavy rainfall was recorded over Kerala & Mahe” on July 18 and 19; and that “heavy rainfall” was “very likely at isolated places” over “Kerala & Mahe during the week”. On **July 26**, the IMD release noted that “heavy rainfall” had occurred “at isolated places over Kerala & Mahe” as of July 26 8.30 a.m. It also specified that “heavy rainfall” was “very likely at isolated places” over Kerala from July 26 to 20. As of the morning of July 26, the IMD listed that Vythiri in Wayanad district had recorded 9 cm of rain in 24 hours.

As of the morning of July 27, the IMD **noted** that “heavy rainfall” had occurred at isolated places over Kerala, and predicted “very heavy rainfall” being “very likely at isolated places over Kerala on July 28 and that “heavy rainfall” was “very likely at isolated places” over Kerala on July 27, 29 and 30.

Over 24 hours as of the morning of July 27, the IMD listed several places in Wayanad district that had received heavy rain: Vythiri (10 cm) and 7 cms of rain each in Karapuzha, Manantoddy and Ambalavayal. The alert listed “impact and action suggested” due to “very heavy rainfall” being “very likely at isolated places over” the state on July 28.

On July 28, the IMD predicted “very heavy rainfall” being “very likely at isolated places” over Kerala on the day, and that “heavy rainfall” was “very likely at isolated places” over Kerala from July 29 to 31. It also suggested impact and action due to very heavy rainfall being “very likely at isolated places” over Kerala on July 28.

On **July 29** too, the IMD release talked only of “very heavy rainfall” being “very likely at isolated places over Kerala” on the day; and predicted that “heavy rainfall” was “very likely at isolated places” over Kerala from July 29 to August 1.

On **July 30**, the IMD press release published at 1310 hours mentioned the words “extremely heavy rainfall” for the first time.

What’s important to note here is that the IMD classifies “heavy rain” as rainfall between 64.5-115.5 mm in 24 hours; “very heavy rain,” as 115.6-204.4 mm; and “extremely heavy rain” is rainfall more than 204.4 mm in 24 hours. Thus, Kerala did not receive any warning of “extremely heavy rainfall” until July 30 – which it did receive one day before the tragedy struck.

According to chief minister Vijayan, the area received 200 mm of rain in the first 24 hours and 372 mm in the next 24 hours, totaling 572 mm in 48 hours. The IMD’s red alert to the state came on the morning of July 30 at 0600 hours: right after the tragedy struck, Vijayan said in a media briefing on August 1. On August 2, citing a **report in *The Hindu***, the Indian National Congress **submitted a privilege motion** against Shah for “misleading” the Rajya Sabha “by his emphatic statements on early warnings issued by the Union government which have been proven to be false”.

Need for better tech and monitoring

However, a local research centre – the Hume Centre for Ecology and Wildlife Biology based in Kalpetta in Wayanad – said that they did inform district and state authorities about the possibility of a landslide in the Mundakkai area on the morning of July 29, around 15 hours before the tragedy occurred.

“Around 20 people did heed it and moved away, they were saved,” C.K. Vishnudas, director of the Hume Centre told *The Wire*.

Their successful prediction has been enabled by collecting micro-level weather data through around 200 rain gauges they’ve set up across the district. From 2018 onwards, their teams have been mapping all landslides in Wayanad (thus also building a database of landslides) and using GIS techniques to come up with a landslide susceptibility map for the district, Vishnudas told *The Wire*.

“We have found that rainfall is the primary triggering factor that causes landslides,” he said.

Factors that the team have based their landslide susceptibility map on also include landslide risk due to soil types (rockier areas such as Chembra Peak in the district, for instance, are less susceptible to landslides). Another important factor is land fragmentation, Vishnudas

said. For instance, land owners now split up their lands into smaller portions and sell them. When new buildings come up in each of those portions, that increases built-up area. Similarly, the presence of linear infrastructure – such as roads – is also a governing factor.

“Climate change is the main reason why this intense rainfall occurred, our monsoon system has changed drastically,” Vishnudas said. “What we need is a Doppler RADAR in the Malabar region, then we will get hourly updates...Currently we depend on radar images shared by the Kochi IMD and we don’t have regional models for prediction.”



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We need to monitor rainfall data in landslide hotspots and prepare early warning systems targeted at hazard-prone areas, said Roxy Mathew Koll, climate scientist at the Indian Institute of Tropical Meteorology, Pune. “This is possible with the current technology and know-how and could in fact save lives and livelihoods.”

Roughly half of Kerala are hills and mountainous regions where the slope is more than 20 degrees and hence these places are prone to landslides when heavy rains occur, he added. “Landslide prone areas are mapped and available for Kerala. Panchayats with hazardous areas should be identified and sensitised.”

Rejected reports: Warnings ignored?

Another need is evaluating land use changes and development activities happening over landslide prone areas, Koll said. “Often landslides and flash floods occur over regions where the impact of both climate change and direct human intervention in terms of land use changes are evident. At the same time, there have been many severe landslides over regions with minimal land use changes also.”

Land-use change and creating a sustainable balance is what the report of the Western Ghats Ecology Expert Panel (WGEEP) in 2012 tried to address. It gridded the entire Western Ghats mountain range into three eco-sensitive zones, based on the ecological significance and sensitivity of areas, and suggested different regulation regimes for each of the zones.

Wayanad is part of the south central Western Ghats and the WGEEP – chaired by ecologist Madhav Gadgil – categorised all three taluks of Wayanad (Vythiri, Sulthan Bathery and Mananthavady) into Ecologically Sensitive Zone I, a zone in which the report recommended the most stringent regulations (including a ban on future construction, a moratorium on mining permits and more).

The report also listed the localities of Wayanad, Banasura-Kuttiyadi and Nilambur-Meppadi as “ecologically sensitive localities” but where action cannot be taken immediately due to factors including a difficulty in arriving at a “well-designed administrative mechanism” to deal with them. However, most states including Kerala rejected the recommendations of the WGEEP report — fearing that it would stall development, and in turn, means of livelihood, in these areas. The Union government put together another team led by K. Kasturirangan, but though the Kasturirangan report cut down on the area to be classified as ecologically sensitive, many states did not accept that report either.

On the evening of July 30, Gadgil **told** *The Hindu* that the Wayanad disaster was man-made; it was the Kerala government’s failure to implement crucial ecological recommendations that brought it on, he said.

Four days after the Wayanad landslides, the Union government **issued** a fresh draft notifying a ‘Western Ghats Ecologically Sensitive Area’ where developmental activities would be regulated if it were to come into effect. It also includes 13 villages in Wayanad district including Noolpuzha, one of the villages affected by the Wayanad landslides of July 30. This is the sixth such draft in over ten years; its timing – right after the landslides – was purely coincidental, an official claimed.

Tourism has driven large-scale construction

One change that Meppadi and its surroundings have witnessed over recent times is the number of resorts and tourist spots that have sprung up around the area. There are many adventure tourism spots in the area, said Philip Varghese, currently a Japan Society for Promotion of Science – United Nations University (JSPS-UNU) postdoctoral researcher at the Akita International University in Japan. For his doctoral and post-doctoral work, Varghese studied sustainable tourism in areas including Wayanad from 2014 onward, and revisited areas in the region as recently as 2023.

Not many associate tourism directly as a cause for the negative socio-ecological impacts in the district, but it indeed is in the case of Wayanad, considering the fragility of the region, Varghese told *The Wire* over a phone interview.

“Previously, the value of land being sold was defined in terms of the quantity of cash crops that could be produced or by projecting the high soil fertility and yield; now the current real estate market is driven by a growing demand for remote land on mountaintops or inside forest cover so that resorts can be built there,” Varghese said.

For tourism, remoteness makes a land unique, and that has meant that numerous resorts have mushroomed in often fragile areas; many are illegal too but the local administration does not have any power to regulate it, he added. District administrators who have tried to bring a change have in fact been quickly labelled as anti-people and anti-development, he added.

“The current real estate boom in Wayanad is completely driven by tourism,” Varghese stated. “There is no concept of carrying capacity or

regulating tourism in any way.”

He further underlined that the investment in real estate and construction is funded by buyers and investors from outside the area, and often, the state.

“Local communities have always lived with the resources available in the area, and rather sustainably; no one needs to teach them sustainability,” Varghese said.

“But for outsiders who invest in land and resorts and hotels, what matters is giving as many luxuries as are available to tourists in cities, and ensuring that their 50-, 100- or 150-room resorts are always full...the concept of less is beautiful does not hold here; unfortunately in tourism, the idea is that more is better,” he added.

Moreover, he noted that while many of these resorts are marketed and sold as eco-friendly, owners have told him that it is not financially viable to undertake eco-friendly or sustainable methods. Even local communities do not get much income from it and jobs go to outsiders, especially as the numbers of stars of a hotel or resort increase, Varghese said.

His **study** published in May this year, which included data based on interviews with locals and their perspectives on tourism in parts of Wayanad, noted that the ever-burgeoning tourism sector in the district has caused a “socio-ecological imbalance”:

“The results reveal that despite the prevalent and persuasive arguments favoring tourism, there are extensive multi-sectoral implications in tourism development that negatively affect both the environment and people at large. These impacts include the erosion of agrobiodiversity-linked traditional Adivasi lifestyles, the displacement of local communities, the encroachment of tourism projects into forests and increased human-animal conflicts, the absence of social security measures for marginalised communities, a decline in traditional livelihood options, and an overreliance on the tourism industry and the private sector. These discernible impacts have pushed the fragile region further into a socio-ecological imbalance.”

While Wayanad may have been able to withstand heavy rains before, with the changes that construction and land-use change have brought in, the land may no longer have the ability to withstand it, Varghese opined.

Other reports corroborate Varghese’s findings. A doctoral thesis by researcher Anoop Thankachan K., submitted to Calicut University in 2020 titled “Transformation of agriculture and environment in Wayanad (1882-2013) noted:

“With the inflow of money from outside, the real estate sector has been developed in Wayanad. The price of land increased steeply due to the development in the Tourism industry in Wayanad. More and more buildings were constructed as a result of this development. At the same

time the number of quarries increased in different parts of Wayanad. The environmental fragile zones also became the nerve centres of this activity.”

Green armour gone

While climate change and torrential rains are factors, land use change in the district is a major issue and also one of the main reasons why the Mundakkai landslide may have occurred, opined N. Badusha, president of the Wayanad Prakrithi Samrakshana Samithi (Wayanad Nature Protection Forum).

Badusha has been working in the landscape for more than 40 years, taking up environmental issues. Numerous resorts have mushroomed in and around the area in recent times, he said, corroborating Varghese’s point.

“Many resorts in Wayanad are located in the Vythiri, Muppainad and Meppadi panchayats,” he told *The Wire*. Mundakkai, where one of the major landslides occurred, is located in Meppadi panchayat.

Quarrying used to be a huge concern in the district too: at one time, at least around 100 quarries were operating in areas like Ambalavayal (which is 15 km north of Mundakkai, as the crow flies), Badusha said. However, a district collector stationed in Wayanad in 2014 banned quarrying in the area and also regulated construction by permitting buildings that were only two storeys high.

The last remaining quarries in the area were also closed after the 2018 Kerala floods, he said. While there are no quarries currently operating in Mundakkai, some still operate a few kilometres away, Badusha added. Wayanad has been witnessing deforestation ever since colonial times, and this continued over decades and well through the 1970s, he added. Now, construction – primarily for tourism – continues unabated, and often, unregulated. Many mapping studies including [this one](#) have noted an increase in built-up area in the district; [one study](#) of land use changes in Vythiri taluk shows that built-up area increased by 19 percent (115 sq km) between 2015 and 2021.

“Construction in fragile areas is Wayanad’s bane,” he said. “There are now even 18-storey buildings, and more than 2,000 resorts operate on hill tops. Everyone wants a great view, so the hilltops – which are already fragile areas because their green armour of trees is gone – are where many are located.”

Resorts also need roads, so even remote areas located on slopes now have roads cut into hillsides. Streams in reserve forests have been diverted to ensure that these resorts have water for their lawns and swimming pools.

“How can landslides not occur then? Mark my words,” Badusha said. “Wayanad will see more landslides in future. Coupled with rainfall like this and the land use changes the district has witnessed, areas like Kurichiarmala and Pancharakulli are next.”

On July 30, the day the landslides occurred, the southern bench of the National Green Tribunal on Tuesday expressed their “deep concern” over the incidents and took up a hearing *suo moto*.

It has asked the Kerala standing counsel to collect data on trigger points such as roads, buildings and existing quarries in and around the affected villages, *The New Indian Express* **reported**.

Would the implementation of the Gadgil or Kasturirangan reports have prevented such a huge landslide? Badusha doesn't think so; but the impacts and loss of lives may have been less severe.

“The landslide would have occurred but we may not have seen such a level of devastation,” he said.

But that doesn't mean the report should not be implemented and it is still not too late to do so, Badusha added. In fact, the area where the landslide occurred on July 30 came in (Zone I) as per the Gadgil report where construction and mining would have been prevented, he said.

Implementing the recommendations of the report would gradually reduce the number of landslides in the area, he said.

“But what is crucial is that resorts operating in such fragile areas, including on slopes of more than 25 degrees be removed. Authorities should crack down on many that are illegally constructed,” Badusha said. “People living in these areas should also be moved to safer ones for their own safety.”

“So this *mazha vaadam* [rain talk] alone is not right,” Badusha said.

“We're increasingly seeing that authorities blame everything on climate change and rain...that incidents occurred because of cloudbursts caused by climate change, which are not in their control.”

Aspects like regulating tourism and truly implementing sustainable tourism are indeed under authorities' control. As is the regulation of construction: such as an 8.7 km tunnel road that the current government has proposed from Meppadi to Anakkampoyil in Kozhikode district because the heavily-used Thamarasserry Ghat road connecting Kozhikode to Wayanad now witnesses traffic jams due to tourist inflow. The **project would reduce travel time** by around one hour but scientists and environmentalists including Badusha have **cried foul**, as it will again be constructed in an ecologically fragile area.

India is “locked in a system of crony capitalism,” **wrote** Gadgil in *The New Indian Express* on August 3. “Under crony capitalism, businesses profit from a close relationship with state power, either through an anti-competitive regulatory environment, direct government largesse, and/or corruption.” Be it in the form of obtaining permits, tax breaks or other undue influence from businesses over the state's deployment of public goods, he wrote.

The “13-year delay” in acting on the WGEEP's suggestions is affecting the Western Ghats “more and more adversely resulting in an increasing frequency of floods and landslides,” Gadgil added. “It is high time we begin to take stringent actions to protect nature and empower institutions of decentralised democracy from gram sabhas and mohalla upwards to turn the tide around.”