Trees on bridges and buildings and the damage they cause

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As warden of UDCT Hostel No 1, I used to interact with the university engineer. We had several sacred fig plants growing on the building and I requested him to get these removed. He could not help because workmen refused. I poured concentrated urea solution and killed all of them. In his next visit, he was surprised to see the results and requested me to visit the Fort Campus of Mumbai University where he had problems of water leakage in the convocation hall. I inspected the structure – nearly a 100 year old building at that time (1996) – and found similar growth on the stone structure, opening out the spaces between two stones, enough to allow rainwater to percolate. Similar growth was also noticed on the iconic Rajabai Tower. I suggested the same remedy, sent him some polymers to seal the gaps and the problem was solved.

Bridge collapse

On 2nd August 2016, a bridge on the Savitri river in Konkan region of Maharashtra, near Mahad, collapsed . Interestingly, the State's Public Works Department (PWD) had certified it for fitness a few months ago in May. In the heavy downpour, the bridge was simply washed off during a night. Unsuspecting vehicles, including buses run by the State Government were lost in the flood. As per a newspaper report (*see picture*), the matter was investigated by three experts from the Indian Institute of Technology (presumably, IIT-Bombay), who declared that the bridge collapsed because of heavy rain and there was no human negligence or error.

I wrote an e-mail to its Director of IIT-B, in which I disagreed with the findings, and stated that my suspicion was the vegetative growth on the arches of the bridge. I attached some pictures of the bridge (sent to me by a friend), which clearly revealed that the arches of the bridge were full of vegetative growth, some near the keystone. I believe that the roots penetrated deep in the structure caused cracks. Since the bridge was made by joining stones and a stone wedge keeps the arch in place, even a slight expansion of the gap can lead to loss of the wedge, and the arch can collapse. In my opinion, this seems to have happened.

To my surprise, I received an email from the Director's office that IIT-Bombay had neither prepared nor submitted any report on the Savitri Bridge. I left it at that!

Dangerous unwanted growth

We often see plants growing on the walls of old buildings, bridges, and structures. These are not taken very seriously. In my view, these represent grave danger. Admittedly, it is difficult to remove these due to their locations and due to religious beliefs of workmen who are unwilling to remove

Heavy rain, not human error led to Mahad crash: IIT report

TIMES NEWS NETWORK

Mumbai: The report commissioned by the Maharashtra government to zero in on the cause of the Mahad bridge collapse has concluded that excessive rainfall led to the tragedy , not human error.

Maharastra PWD minister Chandrakant Patil on Monday said that the IIT report, which was commissioned after the bridge collapse that swept away 42 people did not point towards any lapses on behalf of the department. The minister said that the incident should be seen as a "natural calamity".

The British-era bridge on the Savitri river collapsed on August 2 after which some vehicles went missing. The state had sent three IIT experts to investigate the cause of the bridge collapse and any other related aspects. Patil said that the state government has decided to provide Rs 500 crore for repair of the British-era bridges on a priority basis and the amount would be sanctioned during the ensuing winter session of state assembly, which is scheduled to begin from December 5. The state had earlier said that the inspection of the same bridge was done some months before the incident and the link was found to be fit for traffic to ply.

- The state government says a Tavera, two state transport (ST) buses and 2 other people went missing after a century-old bridge at Mahad on the Mumbai-Goa highway collapsed during a torrential downpour in the region on August 2
- The wreckage of one of the two ST buses swept away in Savitri river is found on August 11, 150m from the mishap spot by a team of marine commandos
- Another ST bus is recovered around 400m away from the mishap site on August 13
- Navy divers pull out the missing Tavera with two bodies trapped inside, 300m away from the collapsed bridge on August 14. Rescue operations are called off later in the day

banyan, sacred fig or *bodhi* tree (*peepal* in Hindi).

The bridges constructed in India in colonial times had stone arches in which each stone was carefully crafted at a specific angle and finally rested by a keystone. Since the cement and concrete industry was not well developed, the space was filled with ordinary rubble, often without a binder. These details can be seen in the remains of the Savitri bridge. The fine gaps are often nested by birds, and seeds of fruit-bearing trees (like banyan), which weigh less than a milligram, entered these gaps via bird droppings.

If the vegetative growth are not removed early, they can be dangerous for the structure. The problem with new bridges may not be so serious (though we can find trees growing on even new structures) because these are cast in concrete. The portion that is filled with clay is reparable in the case of serious defects arising because this part is fully supported. The span is all concrete, is not porous and does not suffer the risk of collapse.

Roots of trees are very strong. They grow slowly, but can separate even the strongest of joints. I have seen some cases where the hardest of the stones like granite have been separated by roots. The process might take a long time, but the impact on the integrity of the structure is serious (as shown in this picture from Mahabalipuram, in Tamilnadu).

There are thousands of bridges of the British era still in use in India. These can continue to provide useful service if proper maintenance is done. One of the most important aspects of maintenance is prevention of vegetative growth within them.