

# Tunnelling Into Our Lives

Tunnels are notoriously slow to develop, taking decades to get off (or under) the ground and, even then, can take years to inch along, usually with huge cost overruns. **Vikram Doctor** reports

Tunnels have got under Mumbai's skin. Much of last year went by with Mumbai's residents having to adjust to the sudden increase in tunnelling work for the city's Metro. As more and more sections of streets got boarded away, people had to recalibrate their estimation of travel time, to find new routes to walk and, for some, to get used to the throbbing sensation of tunnel boring machines (TBMs) crunching below their houses. Not surprisingly, some didn't take this well. Parts of the Parsi community have been up in arms about tunnel work routed below two of their Atash Behrams, particularly sacred fire temples. After their demands were rejected by the Bombay High Court they approached the Supreme Court, only to be turned down again. They plan to continue their protests. Further north in Santa Cruz, some residents worried about their buildings being undermined, waged a campaign to convert the underground into an elevated railway. The chances of such a major change happening at such a late date were remote, and in any case were opposed by other residents worried about an elevated line cutting in front of their windows. Others have tried to get tunnelling stopped, or at least limited in time, because of the noise and shaking—but as of now it continues apace.

Nor is it just the Metro. Last November the Brihanmumbai Municipal Corporation (BMC) announced that the next stage of its ambitious coastal road plan would involve going underground with twin tunnels running from the middle of Marine Drive to the other side of Malabar Hill. This would be done, apparently, with the help of a New Austrian Tunnelling Method, though with its usual opacity no details were given of why this had not been used in the Metro. Mumbai isn't the only place where buried issues are becoming public. In Los Angeles, tech visionary Elon Musk's ironically named The Boring Company has unveiled a nearly two kilometre tunnel, the prototype of his plan to revolutionise urban transportation with tunnels in which modified versions of his Tesla cars can zip at high speed or specially designed pods can carry people and other packages.

The real point of Musk's tunnel though may not be what he plans to send in it, but that he created it all. Tunnels are notoriously slow to develop, taking decades to get off (or under) the ground and, even then, can take years to inch along, usually with huge cost overruns. Musk created this tunnel in barely two years, apparently after getting infuriated at being stuck in LA traffic.

Musk tweeted that he was going to "just start digging" and soon enough was doing just that with a second-hand TBM that he dubbed Godot in a rundown suburb of LA called Hawthorne. (Perhaps not entirely unconnectedly all this came at a time when Musk was facing major problems at Tesla). It is far from clear if he will be able to expand this operation easily, but Musk's rapid progress has caught the attention of urban planners everywhere. He boasts that a city a day is getting in touch with him and is almost messianic in his belief that the future of transportation is tunnels.

One major city that seems to believe this is Singapore. Late last year the city state announced it would unveil an Underground Master Plan in 2019 to detail how, after decades of building ever higher, it now plans to go below ground to solve its acute space crunch. It doesn't (yet) plan to move housing below ground but wants to move utilities like bus depots and data centres into deep tunnels below the city, alongside existing underground sewers and reservoirs.

Space and transport are not the only reasons cities go underground. Increasingly

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Top: In a major landmark for the 32.5km underground Metro III corridor (Colaba-Bandra-SEEPZ), the breakthrough of the first tunnel boring machine was achieved in 259 days on Sep 24, 2018



Right: Lowering of the first TBM on Sep 21, 2017 in Mumbai



Below: The Eastern Freeway twin tunnels in darkness

extreme temperatures are another reason to dig deep. Northern cities like Montreal already have almost entirely covered networks to move through in winter. Australian cities, which now routinely suffer summers above 40 degrees, might want to follow the example of the country's opal mining town of Coober Peddy which is already largely built underground. The historian Gillian Tindall notes "there have been legends concerning tunnels under cities for centuries, usually identified with smugglers, spies, eccentric noblemen or concealed deaths." This comes from her new book *The Tunnel Through Time*, about the building of London's new Crossrail underground link, and she speculates that these urban underground obsessions came from building works in large cities repeatedly uncovering the remains of older cities built before the current one.

But Tindall's book also shows how London's Metro, the first in the world, was the unexpected result of very much the same NIMBY (Not In My Back Yard) feeling that has led people to oppose Mumbai's Metro. When the railways first started building lines to London they were kept to the periphery by wealthy landowners who refused to let their central properties be demolished for the new lines. Combined with the fact that the lines were privately built, without co-ordinated central planning, this led to a highly inefficient situation where three different lines terminated close to each other at three big stations: Euston, King's Cross and St. Pancras. Charles Pearson, a radical reformer and MP, saw the chaos this caused, with tons of travellers and goods disgorged onto the streets in a relatively small area, and came up with the solution of linking these stations underground to free traffic above ground.

Pearson's scheme would become the genesis for the whole Underground; by the time the first station was opened in 1963 the city

had got hooked on the idea of digging deep to travel. Voices against, which warned of suffocation or, as now, destabilising the foundations of the city, were disregarded, with the largely problem free creation of the first line the best proof.

The Underground railway was cheap, allowing working class people, the means to travel easily from distant houses to their place of work—a fact not lost on the capitalists building the railway, who wanted both the labour, but also to keep it far from more expensive areas. European visitors to London were impressed and took the idea to other cities, as far as Istanbul, where the Tünel track was opened in 1875 to zip up to the premium neighbourhood of Pera (it is still functional, the second oldest after London).

At almost the same time tunnels of a different kind were transforming Bombay. Tindall, as it happens, has also recorded this history in her book *City of Gold* which shows how an obscure west coast port, mostly seen as a drain on the resources of the Calcutta based East India company, transformed in the mid 19th century. The process was started by the opium trade, but consolidated with cotton, especially once the American Civil War cut off supplies from the southern states of the USA.

Providentially for Bombay this happened just as the first train lines crossing the Western Ghats were built, bringing cheap cotton from the Deccan. The principal connection came over the Bhore Ghat, a monumental building feat that, as the railway historian Christian Wolmar records in *Railways and the Raj* "required twenty-five tunnels, the blasting out of 54 million square feet of rock." By January 1961 more people were employed there than at the Suez Canal, which was being built at the same time.

The Bhore Ghat enabled Bombay to grow and the British made sure to emphasise their role in it. In his speech at its comple-

tion in Khandala the governor of Bombay Sir Bartle Frere rather crassly compared how "the works of our English engineers on these Ghats will take the place of those works of their demigods, the great cave temples of western India, which have so long, to the simple inhabitants of these lands, been the type of superhuman strength, and of more than mortal constructive skill."

Frere's remark was a calculated put-down of the amazing system of cave temples and monasteries of Western India whose rediscovery from the 19th century well into the 20th made clear what an extensive social system had existed in the region, tunnelled into the hard rock of the Ghats. In an essay published in the *Times of India* (ToI) Annual in 1961, the scholar D.D. Kosambi had noted how there was a tendency to see these in religious terms, but this could be a mistake: "the emphasis on all these caves, as far as we can judge, was on secular art, with the thinnest religious disguise."

Kosambi pointed out that the caves of Western India "follow the trade routes, and the largest caves are invariably at the junction of such trade routes, or in the later period, near the ports at Kanheri, Kuda and Mahad." He argued that they were evidence of the extensive trade network through the region, with the monks and local tribes supported by gifts given by merchants for safe passage as they took their pack animals over the steep hills. Shifting patterns of invasion and new networks to the north and south might have disrupted these routes, but the past evidence of cave and tunnel based prosperity was clear.

Wolmar notes how Frere, in his speech, made little note of the labour of the Indians who had actually built, and in many cases died, to create the Bhore Ghat's tunnels and bridges. He only mentioned in passing how it would enable 'coolies' to come to the city to find work. This tendency to emphasise British achievements and benevolence in building tunnels would be repeated across India.

In 1890 ToI noted a particularly egregious example with the opening of the Khojak tunnel in what is now Pakistan. This was an extraordinary feat for that time, blasting and building—since this was before TBMs came into wide use—for almost four km under the Khojak pass to connect Quetta with the Afghan border. The report noted that the task had appeared to be beyond the skills of local labour so "nearly a hundred Cornish miners were from time to time imported from England and their services were highly spoken of by all."

The Khojak tunnel has another distinction, along with the Ramboda Tunnel in Sri Lanka. Both countries have featured these tunnels on their currency notes—

**The London Underground has made its schematic map a symbol since its almost abstract arrangement of lines shows what an underground can do—make irrelevant the actual topography of the city, in favour of its functional layout**

Pakistan on a now discontinued five rupee note and Sri Lanka on their one thousand rupee notes. India, by contrast, has never really celebrated its tunnels, even though we have since built some truly amazing ones, like the over 11 km long Pir Panjal tunnel that was opened in 2013.

Tunnels are, admittedly, by their nature not easy to display, since all you can show of them is their openings (which is what the Pakistan and Sri Lanka notes do), or perhaps a curve from inside. The London Underground has made its schematic map a symbol since its almost abstract arrangement of lines shows what an underground can do—make irrelevant the actual topography of the city, in favour of its functional layout. As the Metro tunnels its way into Mumbai's history, and similar projects change cities across India, perhaps we need to find ways to acknowledge how deeply tunnels of all kinds can dig their way into our lives.



A signboard announcing a cement factory in Mongla, Bangladesh

## From Paris to Bangladesh, How the Climate Change Accord is Imploding

The onslaught of a new power plant on the fragile ecology of the Sunderbans is fresh proof of the futility of climate reforms. A ground report from **Divya Rajagopal**

Until two years ago, 28-year-old Sajjad Hossain Tuhin, a student of forestry, would walk up to the banks of the River Rupsa in Khulna, Bangladesh, to capture the moment of dusk, when the setting sun left the sky lit up like fireworks. In romantic Bengali literature, it is described as the moment to catch a glimpse of a new bride. But Tuhin doesn't do this anymore. The sun now sets behind the boundary of an upcoming LNG power plant. The banks of the Rupsa are astir with vehicles ferrying rocks and cement to speed up the completion of the plant that will fire up Bangladesh's economic growth.

In December 2018, as political leaders haggled at the European city of Katowice, Poland, over the Paris rulebook on cutting carbon emissions, the Bangladeshi towns of Khulna and Mongla were gearing up to establish the largest fossil fuel-led energy projects of south Asia. In these towns, which are also the gateway to the world heritage Sunderban forests, shrimp farms are being replaced by LNG refineries, and paddy fields with coal-powered plants. The Ganges delta, where the Sunderbans sit, is slated to become the river route to transport natural gas and coal.

All this is part of Bangladesh's effort to reduce its dependency on garment exports by making energy one of the pillars of its economic growth. The World Bank predicts that by 2030, electricity demand is expected to grow to 34GW, more than double the country's current installed capacity. To keep up with the demand, in the next five years Bangladesh expects to launch 19 coal-based power plants with the help of investments worth nearly \$20 billion from China and India.

The story of the economic ambition of least developed countries (LDCs) like Bangladesh is testimony that polluting technologies are here to stay, making the Paris Climate Agreement inadequate to tackle global warming.

At Rampal, a village 14km off the Sunderban forests, four-lane roads are being dug up by construction lorries to make way for a 1,350MW power plant, a joint venture under the Bangladesh India Friendship Project. Linked to the Mongla port, Rampal is expected to light up the entire upcoming industrial belt around there, and holds the key to Bangladesh's leap out of the LDC group. It is also a strategic investment for India as it strives to keep its influence intact—and immune from China—with its closest ally in the subcontinent.

Meanwhile, environmental groups are convinced the power plant will destroy the pristine ecology of the Sunderban mangroves, which act as a natural cover against the frequent cyclones and flooding that the Bay of Bengal brings. A drive from Mongla port to Rampal reveals why the environmentalists are edgy. On one side are lush green paddy fields, mangroves, and banana trees that are distinct to the Sunderban ecology. On the other, are giant gas cylinders and cement factories eating up the green cover.

"The Sunderbans are a different [kind of] forest. If [something] happens on one side, it happens on all sides," says Abdullah Harun Chowdhury, a professor of environmental science studies at Khulna University.

The Rampal plant, which will be constructed on 1,800 acres of land, is expected to generate 3,700,000 tonnes of carbon dioxide. This is as much damage as cutting down 161 million trees. It will also bring 10,000 tonnes of sulfur dioxide, which causes acid rain that damages forests, lakes, and buildings, and forms small airborne particles that can penetrate deep into lungs, Chowdhury adds. He warns that the power plant will destroy the Sunderban

flaura and fauna. Besides being home to the Royal Bengal Tiger and the Irrawaddy Dolphin, the forests are also the nesting grounds of nearly 200 species of birds. Chowdhury also fears loss of employment due to the project as more than 500,000 people are directly and indirectly dependent on the Sunderbans for their livelihood. Asking for too much?

The idea of the Paris Agreement was to nudge countries to cut their greenhouse emissions, helping keep the global temperature from rising above 2°C. The first sign of trouble on the future of the agreement came when US President Donald Trump walked out of the deal. At the Katowice talks, Russia, Saudi Arabia and Kuwait, the world's leading oil producers, refused to commit to the Intergovernmental Panel on Climate Change's (IPCC) road map on cutting carbon emissions. Yet, the expectations are high on smaller countries like Bangladesh to keep the pledge going.

Bangladesh is one of the most densely populated countries in the world, and one of the most climate-vulnerable. Global delivery on the Paris Agreement is critical to Bangladesh's prosperity, and even survival, says Tim Buckley, director of the



An anti-Rampal power plant rally in Dhaka



Bangladesh's big new thermal-power ambitions has caused deep anxiety among environmentalists

Energy Finance Studies at the Institute for Energy Economics and Financial Analysis, a think tank. He adds that the country is caught in an unwinnable dilemma as its continued economic growth is reliant on expanded energy access, even as its already-limited fossil fuel reserves diminish further.

"Any economic expansion that is reliant on increased diesel, LNG, and thermal coal import puts the country at massive energy security risk," Buckley warns.

"It is not that Bangladesh government does not know the damage that these fossil fuel-power plants will do to its ecology, but they are taking this risk. Most governments [follow this philosophy], that environment impact can be [lived with] if it gives money," says Soumya Dutta of Beyond Copenhagen Collective, an environmental non-profit. "You haven't seen India, China, or other countries give priority to environment over economics. How can you expect Bangladesh to do it?" Dutta asks.

The only way poorer countries can be convinced to transition to greener growth is by compensating them. This was one of the strong pitches that LDC representatives had made in the Katowice talks.

The Green Climate Fund, based on the idea that rich countries will fund poorer countries for transitioning towards climate-resilient and low-emission projects, was floated in 2011, but it has remained on paper with no commitments coming through from the West.

*This reporter was the recipient of the Smitu Kothari Fellowship.*

## Red Fort Needs a Splash of History

The challenge for those in charge of Red Fort is to make it come alive for the thousands who visit every day



Reshmi Dasgupta

While it may be Delhi's premier monument, how many people do you know who have visited Red Fort—that once bore the more impressive name Qila e Mualla or Exalted Fortress—in recent times? Most would hark back to vaguely remembered school outings. That those school trips hardly left any impression points to what plagues many monuments in India: lack of emotional connect.

It is heartening that the Archaeological Survey of India may soon allow Red Fort, a Unesco World Heritage Site since 2007, to stay open till 9pm instead of its customary dusk deadline. But what do the 80,000 people who visit daily (1.5 lakh on weekends) actually do there? Do they know what Red

Fort signifies? What will the extension of visiting hours achieve besides increasing ticket sales?

Tickets, incidentally, are not cheap at ₹50 (₹35 if paid by card!) but that does not appear to deter visitors. And most visitors appeared to be young men as their line at the turnstile and then the main Lahori Gate entry was more than triple the length of the 'ladies' queue that I stood in. Both lines, however, moved with appreciable speed leaving me wondering about the efficiency of their 'screening'.

Curiously, very few appear to be herded along by guides, at least when I visited last week. Most of them wandered happily if aimlessly around the only Mughal buildings the vengeful British did not demolish inside the fort after the Revolt of 1957. A few royal mahals survived but scores of public buildings, and homes of courtiers, officials, domestic staff and troops were ruthlessly razed.

In their place are now open lawns and even larger expanses that are overgrown, unfrequented or simply cordoned off. Thank goodness there were no families festooned on the lawns with plastic picnic

paraphernalia but how many of the young people joyously taking selfies at what they deemed to be appropriate spots in the mild winter sun really appreciated where they were?

Why indeed do people throng Red Fort, braving queues and frisking when even the museum and cafes are not functioning yet, though the British-era barracks earmarked for them already sport glassed-in colonnades with 'pops' of garish neon colour. Surely not for the surprisingly unobtrusive new toilets installed by the

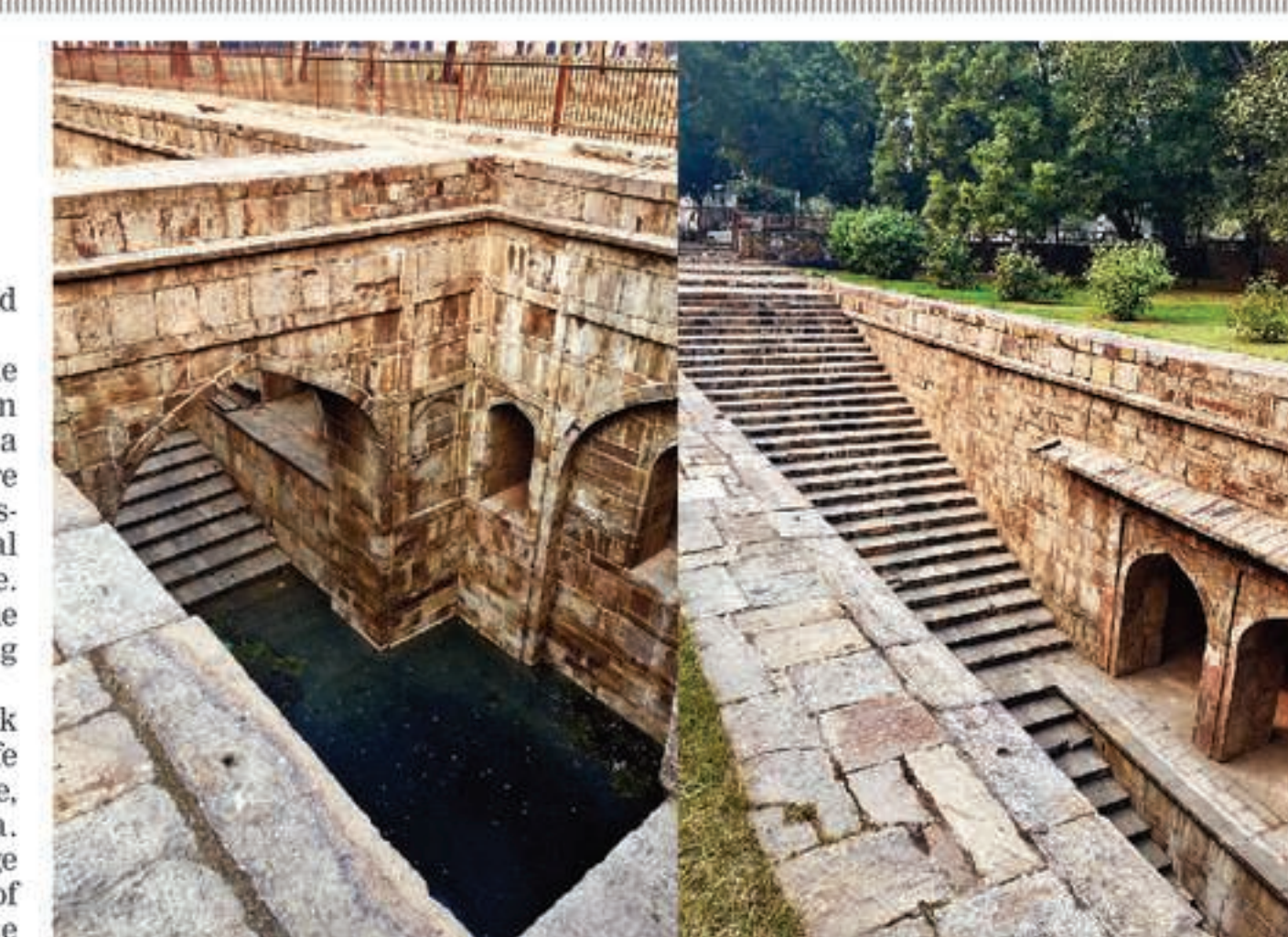
**There is nothing wrong with enjoying the current open expanses of Red Fort, after all back in Mughal times, ordinary people were not allowed in. Independence has given us all access**

private company that recently won the bid to manage such 'facilities'!

At one level it may be because Delhi like so many other cities lacks enough open public spaces so Red Fort's lawns offers a breather. The historical atmospherics are secondary to this basic function. Sadly, history—glorious as it may be—is incidental to the reality of our quotidian existence. That is why we have no sympathy for the lesser monuments that are also choking like us.

But Red Fort represents a unique link between three important eras in the life of our ancient subcontinent—Mughal rule, the British Raj and Independent India. Even a modicum of historical knowledge would make even the empty expanses of the fort meaningful to visitors because absence is often so much more poignant and evocative of what was lost than its 3D recreation in a museum.

There is nothing wrong with enjoying the current open expanses of Red Fort, after all back in Mughal times—and more so when it was brutally turned into a British garrison—ordinary people were not allowed in. Independence has given us all access.



Pre-Mughal baoli at Red Fort

Only when all of us know such facts that monuments gain relevance and we begin to respect them—and therefore, ourselves as well.

The challenge for those in charge of Red Fort then, is not merely to conserve the 'monument' but to make it come alive for

the thousands who visit every day. That also means rethinking how history is taught and viewed by us. If history is not linked to what and where we are today, it becomes meaningless and Red Fort will remain a quaint amusement park with a sound and light show.