

Cities

Resilient cities

The miracle of Kolkata's wetlands – and one man's struggle to save them

The wetlands are this Indian city's free sewage works, a fertile aquatic garden and, most importantly, a flood defence – but they're under threat from developers. One environmentalist is leading the resistance



A bird flies over wetlands at sunrise on the outskirts of Kolkata. Photograph: Sean Gallagher/National Geographic Creative/Corbis

[Patrick Barkham](#) in Kolkata

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The trees on the streets of Kolkata in January are dusty, like neglected pot plants. At traffic lights, salesmen offer feather dusters for drivers to wipe their grimy cars. Shrubs are planted on the central reservation of the city's new flyovers, surrounded by the implausible boasts on signs proclaiming a "clean and green" city. But the most frequently recurring poster, above almost every street corner, appeals for investors to "Come to Bengal – Ride the Growth".

Kolkata, a famously cultured city of 14.5 million people – once the second city of the British empire after London – is keen to catch up with Delhi, Mumbai, Chennai and Bangalore, the dynamic and rapidly modernising megacities of the fastest growing major economy in the world.

Kolkata is also a low-lying city, on average it is barely five metres above sea level, served by two major rivers and surrounded by waterways. Its unique wetlands to the east are under pressure from developers like never before, just when they might prove most useful. Hundreds of buildings, from luxury apartments to colleges to more modest homes, are going up in an area which is supposedly protected from development by law.

Faced by the rising sea levels and increased storminess brought on by climate change, cities all over the world – [a World Bank study named Guangzhou, Miami, New York, New Orleans and Mumbai](#) at risk of most costly damage – are having to rethink their relationship with flood defences, both natural and artificial. According to the World Bank, an optimistic forecast of just 20cm of sea level rise by 2050 would still make Kolkata the [third most exposed city in the world to the risk of flooding](#).

Such projections no longer belong to a distant future. In November last year, similarly low-lying [Chennai experienced cataclysmic floods](#), which caused the displacement of 1.8 million people. Twenty years ago, Chennai had 650 wetlands in and around the city. [Today it has 27](#). Chennai's super-powered growth came at the expense of the marshes that could act as an effective natural flood defence; without them, flood water had nowhere to go except cascade into smart new homes.



A farmer plucks pumpkin flowers in Kolkata. Photograph: Rupak de Chowdhuri/Reuters

From the air, Kolkata's tower blocks are golden in the hazy, smoggy sunshine. To the east, right up against the city sparkles a vast expanse of water: a patchwork of tiny flooded fields bordered by green embankments, ponds, channels and much larger lakes. Take the road to the East Kolkata Wetlands and you're met by a stream of motorbikes towing two-wheeled trailers, piled high with vegetables and fat silvery carp and tilapia being lugged from the wetlands to city markets.

These waterways are a part-natural, part-human phenomenon and their miraculous character is explained by [Dhrubajyoti Ghosh](#), a slight, bespectacled engineer-turned-ecologist-turned-anthropologist, who speaks English extremely softly and very correctly. Ghosh was asked in 1981 to conduct an investigation into what happened to Kolkata's wastewater. The city produced a lot of sewage, didn't have a treatment plant, but didn't seem to have a pollution problem, either. The waste just sort of disappeared.

“The only English word that suits is serendipity,” says Ghosh, who is now 69, as we stand beside one of its ponds, with the ruins of what resembles a temple behind us. As a young man, he made the short commute from Kolkata to examine these lakes almost every day. He found that the pond water “was beautiful”. To diagnose what was occurring didn’t really require a degree in biology, he says, it was simply common sense. Wastewater is 95% water and 5% problem – bacteria.

Carried by long channels towards the ponds, effluent was broken down by UV rays from the sun. (Ironically, Kolkata’s middle classes pay for UV treatment of their tap water to make it drinkable.) This nutrient-rich water is channelled into ponds where algae and fish thrive. Sewage-grown fish may sound gross but Ghosh and others have found them to be safe; Kolkata’s sewage contains very low levels of heavy metals.



The East Kolkata Wetlands. Photograph: Patrick Barkham

I interrupt to ask about the ruined building behind us. Ghosh smiles slowly. He told local people to leave it standing as an important monument. It is the remains of a conventional sewage treatment plant built by the British, which

didn't work. In tropical countries, expensive water treatment plants struggle to banish bacteria. But Kolkata's waterways clean its wastewater in less than 20 days. In a conventional water treatment works, thriving algae might become a problem. Here, the algae is removed by fishermen and fed to the fish that grow quickly in these nutrient-rich ponds. "An abundant population of fish growing on nothing," says Ghosh. "You don't need fish food."

The wetlands serve two functions that at first glance seem contradictory: they are the city's free sewage works and they are also a fertile aquatic market garden. As well as fish, wastewater is used in paddy fields and vegetables are grown on the verdant banks and on a long, low hill created by Kolkata's organic waste. This recycling makes Kolkata the cheapest major city in [India](#). You can enjoy a traditional breakfast for 30p, a third of the price of Delhi.

Kolkata's waterways clean its wastewater in less than 20 days

The wetlands produce 10,000 tonnes of fish each year and the wetland "garbage farms" provide [40 to 50% of the green vegetables](#) available on [the Kolkata's markets](#). This food is fresh and cheap because there are almost no transport costs when it is brought by bicycle from these gardens so close to the centre. "I describe this as an ecologically subsidised city," says Ghosh. "If you lose these wetlands, you lose this subsidy but Calcuttans are not interested to know why they are the cheapest city."

Kolkata's wetlands evolved over several human lifetimes and no public official – until Ghosh came along – grasped how it all functioned. But the fishermen knew. The wetlands were originally low-lying salt marshes and silted up rivers. During the days of the British empire, a Bengali engineer educated in Glasgow designed and built gently graded channels that transferred Kolkata's wastewater from city to wetlands and on to the Bay of Bengal. In the early decades of the 20th century, local fishermen began using this wastewater to farm fish. Ponds were also converted into paddy fields to grow rice. Some 30,000 people make a living from the wetlands. Ghosh's findings sound uncontroversial but they were not immediately recognised by the authorities. "Everybody challenged it for at least 10 years," he says, "but it's such a simple principle that it cannot be challenged."

Real estate in waiting

We walk into the wetlands on a grassy bank that contains a straight channel of water from the city. It is dark matte grey in colour and flows surprisingly quickly. I catch a whiff rather like an urban drain in high summer, a slight tang of sewage. “But it’s not much, is it?” says Ghosh, almost offended at the suggestion that these beautiful wetlands, full of palms, brilliant-white egrets and peacefully industrious human activity, might smell ever so slightly fruity.

After establishing the utility of the wetlands in the 1980s, Ghosh’s next task was to define their area. He drew up a map of these ponds and waterways. Around half the wetlands were taken and their ponds filled in so that a smart new suburb, Salt Lake City, could be built. Ghosh did not quibble. “There is no need to get emotional. The city had to grow. It was organised urbanisation. What’s happening now is not an organised urbanisation.”



Migratory birds fly above wetlands in Hokersar, another site with Ramsar status. Photograph: Dar Yasin/AP

As Salt Lake City was built, Ghosh persuaded West Bengal's then chief minister to accompany him on a trip to the remaining wetlands. He sought to demonstrate the effectiveness of Kolkata's free filtration system to the politician. "I took a glass of water from the pond and I drank it. The chief minister was worried. I told him I do not have a lavatory as a backup," says Ghosh drily. Of course he didn't need one. The water was clean. This natural sewer and food bank is "unique in the whole world", says Ghosh, "and yet we are ready to forget about it."

In the early 1990s, West Bengal's government wanted to build a towering world trade centre in the wetlands. Ghosh advised the opposition led by an NGO with the excellent acronym PUBLIC ([People United for Better Living in Calcutta](#)). After a judge visited the wetlands, Kolkata's high court delivered the verdict in 1992 that Ghosh had been hoping for: the wetlands would be preserved for fishing and farming. It was the first major legal battle in India whereby the environment emerged victorious.

They had no idea that a huge number of people depended on wetlands for their livelihoods.

Dhrubajyoti Ghosh

Ghosh was not finished, however. He was not confident that West Bengal's state government would ever conscientiously protect the wetlands. So he sought a higher authority. Like zoologist Jane Goodall and Sir David Attenborough, Ghosh has been given a [Global 500 Award](#), recognition from the UN for environmental achievement. This at least obliges politicians to acknowledge his letters even if, as he quietly points out, they then throw them in the bin.

Ghosh lobbied international conservationists, including officials working for the Ramsar Convention, which designates globally important wetlands. Ramsar understood wetlands to be places where you could watch birds. "Nothing wrong with that but it was incomplete," says Ghosh. "They had no idea that a huge number of people depended on wetlands for their livelihoods. This was an unknown type of wetland."



Ecologist Dhrubajyoti Ghosh at the wetlands. Photograph: Patrick Barkham

It took a long time to gain international recognition for Kolkata’s wetlands but they were finally given Ramsar status in 2002. It was the highpoint of Ghosh’s career – and he felt it came to mean nothing. Ghosh discovered that the Ramsar status gave no additional legal protection. Ramsar demands that the local government draws up a management plan for every wetlands area within six months of its designation; 14 years on, there is still no management plan for Kolkata’s wetlands.

Worse, says Ghosh, the West Bengal government displays no desire to enforce the 1992 high court ruling. Illegal developments are going up all over the wetlands, and staying up. “People have more confidence in a lack of law than in the law itself,” Ghosh says. And why is the government silent? “They also understand what real estate means to their election campaign. Wetlands are real estate in waiting.”

Today, a banner sign above the road to the wetlands tells travellers that the mangrove forests of Sundarbans, a Unesco World Heritage Site, are just 80km away. There are no signs announcing the East Kolkata Wetlands. They are, literally, off the map.

Your home in the clouds

Stalking the highway along the eastern edge of Kolkata are the new apartment blocks of Rajahat, a gleaming suburb built on soil excavated from the wetlands. “Atmosphere. Your home in the clouds,” boasts one billboard. Electronic advertisements for Vodafone blurt from tower block rooftops. Closer to the smartly dressed office workers sat in motionless rush hour cars are fly-posters for “scholarship tests” and mock exams to help you “learn, compete, succeed”.

Beside these aspirational invitations to personal growth are more appeals from West Bengal’s chief minister, Mamata Banerjee, to “Come to Bengal – Ride the Growth.” Banerjee, who faces an election this spring, came to power in 2011 as a populist, pro-market alternative to Bengal’s long-ruling Communist party. She is desperate to grow Kolkata, and declares she will turn the city into the London of India; by the airport road stands a replica of Big Ben, made from fibre-reinforced polymer, one-third of the size of the original.



Kolkata’s wetlands. Photograph: Patrick Barkham

Beyond the line of apartments marching out into the wetlands at Rajahat is a shanty town and then Aquatica – “a complete family water theme park and

resort”. A dolphin leaping through a rubber ring is painted on its white gates. Beside these is a roadside shack where I drink tiny cups of salty tea with a middle-aged couple, Kartick Chandra Mandal and Shibani Mandal.

Kartick is a fisherman-turned-teacher; Shibani still works in the local fishing industry, packing fish. “The biggest threat to fishing is development,” says Kartick. The water park before us and the low-rise apartment block behind us, fortified with rolls of barbed wire on its walls, were both developments that should not have been permitted. According to Kartick and Shibani, they were paddy fields until a local politician redrew the map – an administrative sleight of hand to move this wetland area into a different parish, which was classified as outside the wetlands and therefore able to be built on.

Such ploys are occurring all over the wetlands, their long-term value trumped by their short-term price as prime real estate. Fishing families allege that ponds are being deliberately sabotaged, with channels blocked up, to force them to abandon their livelihoods. “Land sharks” working for developers use persuasion or intimidation to buy cheap wetland plots and build tower blocks on top. In some cases, the authorities themselves flout their own laws and build small corrugated dwellings on the wetlands for people cleared from the last slums in central Kolkata.

On the rare occasion that the struggle for the wetlands makes the news, its defence is portrayed as elitist. Kolkata’s mayor has declared that the conservation of the wetlands “means little to the common man”. Banerjee, a self-styled champion of the poor, last year stated her intent to find an amnesty for 25,000 illegal buildings within the wetlands area.

Education is usually trumpeted as a saviour of the environment; here, it seems to be the opposite. I wonder if the wetlands could be saved through education, but Ghosh says that no schools bring pupils on trips to the wetlands and no biology lessons are dedicated to understanding this marvellously useful system. Kartick, a teacher, believes that the younger generation are “not as interested or inspired” as his own in preserving the wetlands. “Let there be more ‘dropouts’” he says. “Those who are educated are trying to destroy them.”

Ghosh has dedicated his whole professional life to the wetlands. His wife is dead and his one child lives in Hong Kong, working in high finance. “I worked so hard for recognition from Ramsar and I have got no result. I have lost my life doing this.” It sounds despairing but Ghosh continues to fight for the wetlands. These days, he is less an environmental engineer and more an anthropologist, seeking to describe the unique lives and livelihoods of its residents. If the wetlands can be seen as “heritage”, he thinks, people might cherish them more.

There is one final hope. Aside from providing heritage, a free sewage system and an aquatic market garden, the wetlands’ other urban function – flood defence – is arguably the most indispensable. Chennai’s experience is a powerful lesson. Ghosh realises that it is myopic for his city to mimic Chennai and jeopardise its future by exploiting its wetlands for short-term profit. If Kolkata’s politicians and policymakers can be persuaded too, this famously thoughtful city might avoid the fraught path taken by so many other urban powerhouses who fail to grasp that the sea is always more unstoppable than their own development.

Additional reporting by SB Veda. Patrick Barkham visited Kolkata as part of a [Writers’ Centre Norwich](#), Norwich Unesco City of Literature and University of East Anglia project supported by the Arts Council England and British Council Re-Imagine India fund

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scalisto

There are some very nice takes of Kolkata's wetlands in *Jalsaghar*, one of Satyajit Ray's most beautiful films.

Bonkug

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It's worse than just lead. Mercury, Cadmium, Lithium and many more, besides usual Arsenic, which is massively present in groundwater there. Sometime ago, when there was a huge hue and cry against Coke and Pepsi (mainly initiated by so-called Swadeshi PR, by BJP), it became clear that even coconut water is "highly contaminated" in many parts of India. Moreover, most of the wetlands in Kolkata is gone, due to real estate promoter-politician-bureaucrat nexus for real estate development. Most of the rights to use 'dhapa' go to political mafias, who then subcontract it to other local goons. The people who actually do the farming hardly get much. It has a also a huge impact in city's drainage system and routine submergence of a large part of the city under water in slightest rain.

Bonkug

I am not so sure what the articles says. Lack of any systemic sewage treatment is a huge and growing problem in Kolkata and many other cities in India. There is, probably, no waste, sewage treatment plant in that big metro city. I was talking to a medical and research waste disposal contractor in Kolkata. he said that all the waste his company collects from so many hospitals, private clinics and research institutes (that use very toxic and even radioactive materials) are directly thrown to "Dhapa", the waste disposal ground in Kolkata, as mentioned in the article. The fruits, vegetable, even fish grown there are "highly contaminated" (by heavy metals and many other pollutants), mainly because high air and groundwater pollution that arises from such waste.

EnduranceWriter

Very interesting... would not be surprised to learn that Manila has a similar wetlands ecosystem that is critical to protect.

AlfaField

Thank you for doing this important work, Mr. Ghosh.

Leeblue

He had better start saving money to pay baksheesh to the government officials that give out the building permits, not to give building permits in the wetlands !

Otherwise the property developers will pay the baksheesh and the officials will be a few Lakh richer;-) Indian economics. Come to think of it, worldwide economics!

AnnPettersson

Mr Dhruvajyoti, Thank you for such an interesting life work.

Waihekepukeko

14.5 million people and no sewage system? You wouldn't catch me drinking the water or eating the fish and vegetables. While that swamp is essential for flood control has to be a stew incubating anything from salmonella and cholera to hepatitis and bird flue.

PhilipD

A huge proportion of the worlds fish (farmed and unfarmed) and vegetables are grown using human sewage directly or indirectly as an input. There is nothing new, or unsafe about this in principle. And plenty of the worlds most advanced cities supply drinking water from rivers in which treated sewage is discharged. Almost all human pathogens break down quickly with exposure to natural UV and as they go through the food chain via algae.

The East Kolkata system is just a giant, semi-natural version of a wetland sewage treatment system, which are commonly used around the world - in fact, they are generally considered as the best possible tertiary treatment system if the land area is available. The Kolkata system is of course not ideal - you would preferably have pre-treatment of the sewage and more intensive monitoring. But in a country like India they have neither the money, the reliably energy infrastructure, or the regulatory capacity to have the type of treatment system you would find for a European or US city (excluding Flint of course). This is an excellent working system - cost effective, economically sustainable, environmentally sustainable and reliable.

I doubt if any sewage engineer who wasn't trying to sell something would recommend its replacement with anything else.

Waihekepukeko

"Not ideal" means that you almost inevitably get the shits in India. I wouldn't drink the tap water in either the US or India and given the scams I've heard of I wouldn't drink bottled water either. Read "Beyond the beautiful forever"

[DeadJello](#)

Very informative article. This gentleman deserves a larger audience for his vision, but I fear that humans will fail him in his endeavors. Nevertheless he should be proud of his life's work.

[elcollonsdelgos](#)

Short term economic gain for a mere few will come back to eat us all.

[paul939](#)

Well written article, I wish Mr.Ghosh good luck in his efforts. I am afraid however that the west bengal government doesn't really care about the environment.

[JonBites](#)

A valiant fight against overdevelopment in one of the most rapidly changing countries in the world. Ultimately he is battling against overpopulation and overdevelopment. If population was addressed his task would be easier. Interestingly the two British names mentioned in the article are David Attenborough and Jane Goodall, both of whom are patrons of the Population Matters charity. If human numbers were addressed in what is to become the world's most populous country it would be a much better place to live in. The piece does not mention this crucial fact in an otherwise well written article.

[Kavi Mazumdar](#)

India's share of world population is lower than historic levels.

[thisisanicknameol](#)

Asia has seen an epidemic of overdevelopment in the last few years. Developers have scrambled to parcel up land rendered cheap by the financial crises of 1997 and 2008, and use the fastest means possible to recoup their money: huge blocks of luxury apartments, gated residences and boutique shopping malls. All of which is designed to attract a high-paying clientele and create and sell them the bubble of an upper middle-class lifestyle. In the process, they do not account for the environment or urban planning considerations, such as the impact of increasing urban density on a specific area's infrastructure.

In the rush to build, quality of construction is often forsaken too, sometimes with catastrophic consequences. Neither do they bear in mind the wider-scale economic permutations, leading to wildly optimistic projection analyses and, ultimately, wasted development. The end result is swathes of vacant million-dollar apartments which few will buy and even fewer can afford. In Kuala Lumpur, where I spend a lot of time, it is estimated that over 40% of new-dev houses and apartments are empty (I'm being conservative because I don't quite remember the number; it may actually be higher).

Developers take these risks because they make their money back anyway and usually they have the backing of some local politician who gets a cut and a property out of the deal. These new-devs do little to solve housing problems; they do not provide anything for the people who need them most. These developers are willing to trash the environment and community for not even that much gain. Surely they are the ultimate condensation of the evil that exists today.